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The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY.

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(For Details, see over.)

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No. 6. JUNE, 1900. Vol. XV.

TWELVE YEARS' WORK OF THE ORDNANCE SURVEY, 1887 TO 1899.*

By Colonel Sir JOHN FARQUHARSON, K.C.B., R.E.

Preliminary.

I am afraid I am about to deal with a very dry subject. The record of the work of a public department, however interesting to specialists or to those who have taken part in it, can hardly be made interesting to a general audience. For it must necessarily in a large measure consist of dull figures and uninteresting dates. As, however, it is now twelve years since any Survey officer has written or spoken on the subject (the last occasion having been when Sir Charles Wilson read a paper at Manchester on September 6, 1887), I could hardly see my way to refuse when I was asked to write a short account of the recent work of the Ordnance Survey. I can only hope that you will receive what I have to say with as much patience and indulgence as you can.

There is nothing new or original in the paper. Its main subject is the work of the Survey from 1887 to March, 1899, when I left Southampton, but it is necessary to make a few preliminary observations on the previous work of the department.

I have endeavoured to shorten the paper, and to avoid stating to you a number of figures as to areas, which would convey little information to your minds, by preparing shading diagrams to show the progress made by the Survey during the above period upon the various branches of its work. The extent of the shading shown upon each diagram represents the extent of the work done during the twelve years; and

* Read at the Royal Geographical Society, March 20, 1900.

the shading will enable you to see at a glance both the amount of the work done and the localities in which that work has been proceeding.

Another point which I have desired that you should have an opportunity of criticizing is the variety and the quality of the Ordnance Survey maps. Criticisms have been at various times made as to the quality of the latter as compared with the quality of the maps of other countries. The Survey has no desire to avoid such comparisons. I have made a collection both of the English Survey maps and also of the maps of foreign countries, on all the scales available. These collections are open to the inspection of such of you as take an interest in map-making, and I think that they will not only enable you to compare the relative quality of the maps, but that they will, incidentally, also indicate to you the differences between the nature of the work carried out by the National Survey of England and the nature of the work done by the Government map-making departments of other countries.

I. The Work of the Survey from 1784 to 1887.

1. *One-inch Scale Surveys.* 1784 to 1824.

The first operation of the Ordnance Survey of the United Kingdom, namely, the measurement of a base-line in 1784, was undertaken as a consequence of the action of the Government of France. In 1783 the French Government invited the British Government to connect the Paris and Greenwich observatories by a series of triangles. This proposal was supported by the Royal Society, who recommended that General Roy, one of its members, should carry out the work. In 1784 the first base-line was measured on Hounslow Heath, and on September 23, 1787, the triangulation having been carried eastward to the coast of Kent, three French scientific men met General Roy and others at Dover, and arrangements were made for carrying reciprocal observations across the Straits of Dover. Soon afterwards two stations on the French coast (Blanc Nez and Montlambert) were intersected by observations from the two English stations at Dover and Fairlight Down. The result was that the distance from Dover across the Channel as computed from the Hounslow Heath base was found to be 7 feet longer than the distance as computed from the French triangulation.

From the triangulation of Kent thus established, a survey, on the scale of 1 inch to a mile, of that county was undertaken in 1797, and the resulting map in four sheets was published on January 1, 1801. It was a wonderfully good and accurate map for the period at which it was produced.

A second edition of the same survey was published by Colonel Mudge in 1819 as Sheet III. of the old series 1-inch map of England and Wales. This Sheet III. shows that there was by 1819 a considerable improvement in the English style of map-engraving. These old series

1-inch maps of England and Wales were the only maps prepared and published by the Ordnance Survey down to 1824, but they continued to be produced, simultaneously with other surveys, down to 1844, when they had reached as far north as South Lancashire and Yorkshire. They were, especially the later sheets, excellent topographical maps. There are two specimens of them, the sheet containing Birmingham, and the sheet containing Snowdon, in the portfolio of English maps.

2. *Six-inch and 5-feet Surveys.* 1824–1855.

The first advance as to the scales of the Survey was made in 1824, when surveys on the scale of 6 inches to a mile began. In 1824 there was an Irish land question, as there is now; and for valuation purposes the Government gave Ireland 6-inch maps, the 1-inch survey of England being meantime largely suspended. This 6-inch survey of Ireland proceeded from 1824 until its completion in 1840. By that time it had been found so useful for purposes other than those connected with land that the 6-inch scale was adopted by the Government for the survey of the counties of York and Lancaster in England, and of several counties of Scotland, the 1-inch maps to be obtained from the 6-inch by reduction. These 6-inch maps were engraved on copper; there is a specimen in the portfolio of English maps. They were well engraved, and had more numerous contours than the later maps. These 6-inch surveys proceeded from 1824 to 1855.

The towns in the above counties were at the same time—that is, in 1840, ordered to be surveyed and published on the scale of 5 feet to a mile. These town maps were also engraved on copper, and there is a specimen of them in the portfolio of English maps.

3. *Six-inch, 25-inch, and 10-feet Surveys from* 1855 *to* 1880.

The next advance as to the scales of the Survey was made in 1855.

In the early fifties Parliament had taken up the subject of the best scale for the National Surveys, had held various discussions, and, as might be expected from the constitution of that body, had come to various conflicting decisions regarding it. About this time Sir Henry James had become Director-General of the Survey. He held very strong views on the subject of scales, lost no opportunity of pressing them upon the Government and the country, and in 1855 he gained his point. In that year the Treasury, in accordance with the recommendations of a scientific committee, ordered that for Great Britain the agricultural districts should be surveyed for the scale of 1 : 2500, or about 25 inches to a mile; the towns for the scale of 1 : 500, or about 10 feet to a mile; and uncultivated or mountainous districts for the scale of 6 inches to a mile. The 1-inch maps were to be obtained by reduction from those larger scales; and, later, it was decided that the "Old Series" 1-inch maps, so far as already completed, that is for the whole of England and

Wales south of Lancashire and Yorkshire, should be superseded by a "New Series" 1-inch map based on the new large-scale surveys.

This year, 1855, therefore, marks an entirely new departure in the work of the Survey. Nearly the whole of the survey maps of Great Britain which are now in use are based on the new surveys and scales decided upon in that year, and nearly the whole of the survey work done in Great Britain before that year has been put on one side.

From 1855 until 1880 the Survey had a comparatively quiet time. By 1880 the four northern counties of England and nearly the whole of Scotland were completed on the new scales. Some progress had also been made in England in the south-eastern counties and in the mining districts. At first an endeavour was made to engrave the new 25-inch and 10-feet plans on copper, but the attempt was found to be hopeless; Sir Henry James found that the time taken would be too great, and that the necessary engravers could not be got. The plans on the two largest scales were therefore published by zincography, the buildings being coloured by hand. For these large scales the zincographic method of production has been found for all practical purposes sufficient, while it is much more rapid and much less expensive than copper-plate engraving.

Specimens of the earlier and later 25-inch and 10-feet maps can be seen in the portfolio of English maps. The latest of the changes made in the style of these maps are in accordance with the recommendations of the Departmental Committee of 1892, alluded to later on.

4. *Acceleration of the Cadastral Surveys,* 1880 *to* 1890, *and Completion from* 1887 *to* 1890 *of the Publication of the Cadastral Plans of Great Britain.*

By 1880 a new political question had arisen—that of the cheap transfer of English land. A select committee had reported to the Government that the Ordnance Cadastral Survey was suitable for carrying out this object, and had recommended that that survey should be immediately completed for England and Wales. At the then annual rate of expenditure and the then established strength employed on the survey, it was estimated that it would not be completed until the twentieth century—that is, it would not have been completed now. The Government in 1880 asked Colonel Cooke, the then Director-General, whether, if they doubled his Survey vote, he would undertake to complete the Cadastral Survey of England and Wales within half the estimated time—that is, if he would undertake its completion by 1890 instead of 1900. The question was a difficult one. To double within a limited time the strength of a large number of surveyors involved manifest risk to the accuracy of the work, and accuracy has always been one of the paramount objects of the Ordnance Survey. But Colonel Cooke faced this risk. He drew up a scheme, with estimates, for completing the work, and organized the large additional force which had to be employed.

His confidence was justified by the result. The total estimated cost of the work for the ten years was about £1,600,000. It was completed within the time and cost estimated, and it has stood the test of accuracy as well as the work done before the acceleration, while the cost per acre was not increased. I do not think that Colonel (now General) Cooke has ever received the credit due to him for this service. If, as he might very easily have done, he had declined the responsibility of undertaking it, not merely the Cadastral Survey, but all the smaller scales would have been greatly delayed; Devonshire and the Midlands would still have been without a one-inch map of later date than the earlier part of this century, while any revision of the older maps on all scales could not even now have been begun, much less have made the considerable progress which has been made. It is true that the main object of the acceleration, namely, the cheap transfer of agricultural land, has not even now been attained; but that is not the fault of the Ordnance Survey or of General Cooke; rather, I suppose, it is the fault of our system of government by party. It is true that in 1897, by some happy accident, the present Government at last succeeded in passing a Land Transfer Act; but, hitherto at least, it applies only to the county of London, which had already, long before 1880, had large-scale surveys. The application of the Act to the country in general and to agricultural land remains still a question for the future.

But the acceleration of the survey had caused another change to be made in the method of production of the maps. This time it was the 6-inch maps for which copper-plate engraving had to be abandoned. After 1880 the output of 6-inch maps under the acceleration became so large that the time and cost of copper-plate engraving became prohibitive, and Colonel Cooke decided that those maps should be produced by photo-zincography. Under this method it was possible to publish the 6-inch maps not only as soon as, but earlier than, the maps on the 25-inch scale, while if engraved their publication would have had to be postponed for years. But the exigencies of photography required that they should be published by quarter-sheets instead of full sheets. Recently this difficulty has been got over, and the 6-inch maps of part of Scotland and Ireland are now being published by photo-zincography in full sheets. Although, from the nature of the case, zinc maps can never rival copper-plate maps, the object has been to bring the former as near the latter as possible in quality. Specimens of the various forms of the English 6-inch map are in the portfolio for English maps.

5. *The Departmental Committee of* 1892.

Some of the advantages of the service done by Colonel Cooke in 1880 have been already mentioned, but there is another, which, although not strictly in chronological order, may be mentioned here. In 1892 the Board of Agriculture appointed a Departmental

Committee, of which Sir John Dorington, M.P., was the chairman, and Colonel Johnston, the present Director-General of the Survey, was the secretary, to report upon the work generally of the Ordnance Survey. The committee was a very strong one. It received a large amount of evidence, and made a most valuable report, which has in every way greatly strengthened the position of the Survey. But many of their recommendations, the most important of which have been given effect to by the Board of Agriculture, and which have either been already alluded to or will be alluded to later on, could not have been carried out unless the acceleration of the Cadastral Survey of Great Britain had been completed, as it had been, before the committee was appointed.

II. The Work of the Survey on Large-Scale Maps from 1887 to 1899.

1. *Completing the publication of the Cadastral Survey of Great Britain.* 1887–1890.

We have now reached the period in the history of the Survey—1887 to 1899—with which this paper has mainly to deal, and it will be convenient to divide the account of the work done during that period into two heads, namely, first, maps on the larger scales—that is, maps on scales of 6 inches to a mile and upwards; and, secondly, maps on the smaller scales, namely, maps on scales of 1 inch to a mile and less, usually called topographical maps.

It has been stated above that Colonel Cooke in 1880 had undertaken that the survey would complete and publish the large-scale or cadastral survey of England and Wales by 1890. By 1887 the field work and most of the manuscript plans for the accelerated survey had been practically completed, and little remained to be done except to finish the publication of the maps. From 1887 to 1890 this work was pushed on as rapidly as possible by Colonel Bolland, who was then in charge of the Publication Branch of the Survey, and by 1890 it was complete, as had been in 1880 promised by Colonel Cooke.

Diagram No. 1 shows the area published after 1887. It amounts to about 10,000 square miles.

2. *Large-scale Revision Surveys, ordered* 1886.

Apart from the completion of the publication of the Cadastral Survey just mentioned (1887 to 1890), the principal work of the Survey in Great Britain from 1887 onwards assumed the character of revision surveys as distinguished from original surveys. In November, 1886, Colonel Sir Charles Wilson was appointed Director-General. It was fortunate for the Survey that an officer so able and distinguished, and

No. 1.

COMPLETION OF PUBLICATION OF CADASTRAL SURVEY OF ENGLAND AND WALES.

Published 1887-99.

of so large a survey experience both at home and abroad, took charge of the work at so important a time. He had practically to organize not only most of the work which filled up the period from 1887 to 1899, but much of the work which will go on for the next ten years. Just as the name of General Roy is associated with the commencement of the Survey, of General Colby with the great triangulation and the introduction of 6-inch maps, of Sir Henry James with the introduction of the 25-inch and 10-feet maps, and of General Cooke with the acceleration of the Cadastral Survey, so will Sir Charles Wilson's name be associated with the commencement and organization of the work of Revision Surveys for Great Britain, the necessity for which had long been pressed upon the Treasury by successive Directors, but which it fell to him to begin.

3. *Preliminary Re-surveys and Revisions, and Completion of the Original or First Edition 25-inch Maps of Great Britain.* 1887 *to* 1894–95.

On December 22, 1886, about a month after Sir Charles Wilson had been appointed Director-General, the Treasury authorized a revision of the original 10-feet, 25-inch, and 6-inch maps of the Survey to be carried out. Later it was decided that maps on those scales should be revised at intervals of twenty years, and the 1-inch maps at intervals of fifteen years. But before the revision proper, that is, on the same scale, of the original 25-inch maps could be taken up, there was a good deal of preliminary work to be done, and the first work to be undertaken was a re-survey on the 25-inch and 10-feet scales of Lancashire and Yorkshire. Those counties had, as has been above stated, been surveyed for the 6-inch and 5-feet scales about forty-years before, and that survey had been reckoned as part of the Cadastral Survey of England. But it was plain that they were now at a disadvantage as compared with the rest of Great Britain, which had been provided with 25-inch and 10-feet maps. Their re-survey was begun in 1887 and completed in 1892.

There followed a re-survey on the 25-inch and 10-feet scales of the counties of Scotland and of the island of Lewis, which had been surveyed for the 6-inch and 5-feet scales over thirty or forty years before, and which were therefore on the same footing as Lancashire and Yorkshire. Their re-survey began in 1892, and was completed in 1895. By the publication in 1895 of the last 25-inch map of the island of Lewis, there was completed the original or first edition of the 25-inch survey of Great Britain, which had been begun under Sir Henry James in 1855, just forty years earlier.

The most prominent feature in the re-survey of Yorkshire and Lancashire was the immense development of towns and urban districts since the last survey. Practically the whole of South-west Yorkshire and South Lancashire had to be entirely re-surveyed, the original survey

being quite lost in the universal additions to, and changes in, the buildings and streets which had been first surveyed. Although the town or 10-feet surveys were curtailed as much as possible, yet for the two counties they extended over 124,745 acres, requiring about 3250 plans. The same feature occurred in the revision of London on the 5-feet scale, which followed on the re-survey of Lancashire and Yorkshire. It included the town survey of 116,582 acres, requiring about 760 5-feet plans. An entirely new survey had to be made of the whole of the outer ring of London. It was begun in 1890 and completed in 1894.

Re-surveys or revisions of the 10-feet plans of Edinburgh, Glasgow, the Tyneside towns, and Plymouth were taken up and completed about the same time. Their original large-scale plans were very old.

The total number of plans of the above towns, which were completed from 1887 to 1894, amounted to nearly 5000, covering an area of 275,000 acres, or about 410 square miles. When it is remembered that the scale of most of these plans is about 40 feet to an inch, that is, large enough to show door-steps, which are in fact shown on them, the laborious and costly nature of this town work will be understood.

Complaints have been made, and down to quite recently, of the slow production of its topographical maps by the Ordnance Survey as compared with the rapid production of their topographical maps by other countries. The systems in this country and abroad are so different that there are no grounds for such comparisons. Foreign countries do not publish at all such maps as our plans on the 10-feet or even the 25-inch and 6-inch scales; they only publish topographical maps analogous to our 1-inch maps. France, for instance, with the exception of a few towns on a scale of about 3 inches to a mile, publishes no maps on a scale larger than 1 : 50,000, which is a little larger than our 1-inch map on the 1 : 63,360 scale. The result is that the whole of France, about 206,000 square miles, is covered by 1100 of these 1 : 50,000 sheets. I have had two diagrams prepared, both on the same scale. One (Diagram 1A) is of Great Britain, of which the total area is about 91,000 square miles, showing by shading the areas—amounting to a few hundred square miles—for which, from 1887 to 1894, as above stated, the Ordnance Survey had to prepare nearly 5000 maps. The other shows the area—about 206,000 square miles, namely, the whole of France*—for which the French General Staff would have to prepare only about 1100 maps. A comparison of these two diagrams, and of the relative number of maps, shows the entirely different nature of the work done by the respective Government map establishments of the two countries.

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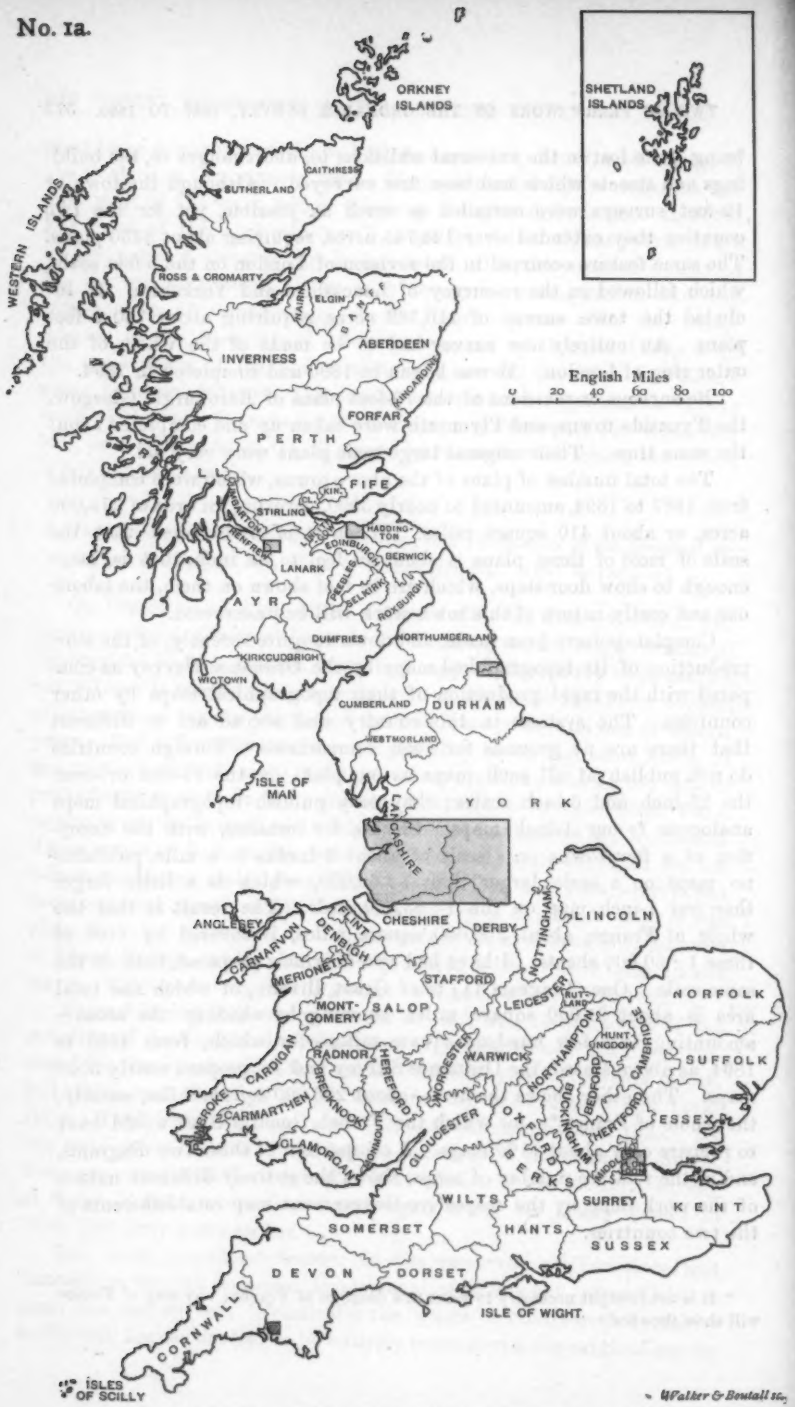
* It is not thought necessary to print this diagram of France; any map of France will show the area.

No. 1a.



Walker & Boutall sc.

AREA FOR WHICH THE SURVEY PREPARED 4913 TOWN-SCALE PLANS, 1887–1894.

Lancashire and Yorkshire, London, Tyneside Towns, Edinburgh, Glasgow, Plymouth—Area published 1887–94,

4. *Abandonment of the Town Scales.* 1894.

But the large amount of work thrown upon the Survey by the town scales from 1887 to 1894 had drawn attention to the great, and rapidly increasing, cost and delay which they involved. The Departmental Committee of 1892 recommended, after hearing Sir Charles Wilson's evidence, that in future all towns should bear the cost of keeping up their own maps on any scale larger than 25 inches to a mile; and in 1893 the Board of Agriculture asked the Survey what would be the relative cost of revising the whole of Great Britain, firstly, if the town scales were retained, and, secondly, if they were abandoned. The answer was to the effect that if the towns were to be revised on the 10-feet scale the cost of revision would be about 50 per cent. more than if the whole country were revised only on the 25-inch and 6-inch scales. The Treasury then, in January, 1894, ordered that in future these town surveys should not in Great Britain be carried out except at the cost of the towns themselves. This decision was amply justifiable, and has given great relief to the work of the Ordnance Survey. Town surveys had gone on from 1855 to 1894, or nearly forty years. During that time every town of any importance in Great Britain has been provided with either 5-feet or 10-feet plans, which it can if it pleases keep continuously up to date at no great difficulty or expense.

Specimens of these town maps at various periods are in the portfolio of English maps.

5. *General Revision of the 25-inch and 6-inch Maps of Great Britain.* 1894–1899.

By 1894 the preliminary re-surveys or revisions of Lancashire and Yorkshire, the six Scottish counties, and the towns above mentioned, had been completed, and it was possible to begin, for the first time, that regular and general revision of the original 25-inch and 6-inch maps of Great Britain, which it is intended in future to carry out every twenty years. The districts which had the oldest surveys were taken up first; they were mainly in the north of England and south of Scotland. The work was of a kind new to the Survey. Chain surveyors had to be trained to take the original maps to the ground, and plot on them to scale the alterations which had taken place, and the draughtsmen in the field divisions had to be trained to trace the revised maps for zincography. The work has, however, proceeded rapidly. The rate of progress is two or three times that of the original survey. But there is a danger for which the Director-General may have to provide. One of the survey divisions has already been seriously retarded by having to revise a large town at the town's expense on the 10-feet scale. If many such cases occur either additions should be made

to the survey strength, or the work will not be completed by 1910, the estimated time.

In 1896 a scheme, based partly upon extent of country, partly upon population, was drawn up under which each of the eight survey divisions in Great Britain is the centre of a district of which it will in future carry out revision surveys. It is, however, liable to modification according to the results of experience.

There have had to be changes in the method of producing the revised 25-inch maps, which are produced partly by zincography and partly by photo-zincography. The buildings on these maps are now printed cross-ruled instead of being coloured by hand, a change recommended by the committee of 1892, but which would in any case have had to be adopted after 1894; it would be impossible without adding largely to the buildings and staff at Southampton to colour by hand the largely increased number of maps now printed.

The progress on all the 25-inch and 6-inch re-surveys and revisions from 1887 to 1899 for Great Britain is shown on diagram No. 2. It will be seen that by far the most difficult areas of the country, and most of the oldest maps, have been re-surveyed or revised since 1887, but part of this area will come within the twenty-year limit, and will have to be again revised before 1910. I have, however, for the sake of simplicity, included in one diagram all the large-scale re-surveys and revisions carried out from 1887 to 1899.

6. 25-*inch Re-survey of Ireland.* 1887–1899.

Meanwhile, while the work of the Survey in Great Britain had changed from surveys to revisions, the work in Ireland had changed from revisions to re-surveys. I have already stated that in 1840 Ireland had 6-inch maps for the whole of the island, and was then as to its maps far ahead either of England or of Scotland. By 1887 it was as much in arrear as it had been ahead in 1840. With the exception of County Dublin, which had been surveyed and published on the 25-inch scale, Ireland had still in 1887 only its 6-inch maps. In the end of the latter year the Treasury sanctioned the re-survey of Ireland for the 25-inch scale; but it was not until 1891 that two additional survey divisions, one at Ennis and the other at Cork, could be organized for the work. Since 1891 the progress of the work has been slow. It has been all in what are usually called the congested districts in the west of Ireland. I have obtained one of the maps of these districts on the 25-inch scale, as an example of the kind of work that has had to be done. This map has more than fifteen hundred enclosures, or parcels, as we call them on the survey; the area of the whole map is 960 acres, so that the average area of each enclosure is about two-thirds of an acre. The Survey had previously not met with work so laborious in any agricultural or country

No. 2.

Walker & Boutall sc.

PROGRESS ON LARGE-SCALE RESURVEYS AND REVISIONS OF GREAT BRITAIN.

Resurveyed or revised 1887 to March, 1893,

district, and I am glad to hear from the present Director-General that he has been authorized to organize a fourth division for pushing on the re-survey of Ireland.

The diagram No. 3 shows the progress which has been made in the field on the re-survey of Ireland on the 25-inch scale up to March, 1899; and the specimen 25-inch map of County Mayo above mentioned, as well as, for comparison, an ordinary English 25-inch sheet near Canterbury, and a Scotch sheet, are in the portfolio of English maps.

III. The Work of the Survey on Small-Scale Maps from 1887 to 1899.

1. *Completion of Original 1-inch New-series Map of England and Wales in Outline.* 1887–1896.

Having now completed the record from 1887 to 1899 of the large-scale maps, I will turn to the record for the same period of the topographical maps on the 1-inch and smaller scales; and the first of these is the first edition of the new-series outline map of the United Kingdom on the 1-inch scale.

On December 31, 1887, the outline 1-inch maps of Scotland and Ireland were complete, but 220 sheets of England and Wales remained unfinished. They were completed in 1896. All these 1-inch maps have been obtained by reductions from the Cadastral or large-scale maps of Great Britain and Ireland. It has been contended that it would have been better to have made an entirely independent 1-inch survey of the whole country. I doubt this. At any rate, I believe one thing is certain, namely, that we are much better off now with the 1-inch maps based on the larger scales than we should have been if a separate 1-inch map had been made.

Specimens of the various kinds of the 1-inch maps of Great Britain, from the earliest to the latest, are in the portfolio for English maps.

Diagram No. 4 shows the progress made on engraving the 1-inch outline map of England and Wales from 1887 to its completion as above-mentioned in 1896.

2. *Progress of the 1-inch Hill Map of the United Kingdom, New Series, from 1887 to 1899.*

As to the 1-inch map of the United Kingdom with engraved hill features, about 40 sheets of Scotland out of 131, most of them containing only islands, about 30 out of 205 sheets of Ireland, and about 280 out of 360 sheets of England and Wales, remained to be completed on December 31, 1887. Scotland and Ireland were completed in 1895. On March 31, 1899, about 100 full sheets of England and Wales still remained to be engraved with hills, so that about 180 sheets of England,

No. 3.

IRELAND: PROGRESS ON 25-INCH RESURVEY.

Resurveyed 1891 to March, 1899.

No. 4.

COMPLETION OF ENGRAVED 1 INCH OUTLINE MAP OF ENGLAND AND WALES.

Engraved and published 1887–96,

40 of Scotland, and 30 of Ireland were completed from 1887 to 1899. The estimated date for completion of the entire work in the United Kingdom was at one time 1925, later it was 1910, now it is 1902. I do not now think the work can be satisfactorily completed by 1902, and I think the Director-General should apply for authority to extend the time for either two or three years. Competent hill engravers are most difficult either to get from outside or to train in the department. It must be remembered that this work once done remains always good, that great part of that already done has been extremely well done, that the most important part of the country from a military point of view is already completed, and that, judging by the sales, the general public prefers using the outline map to using the hill map. I have no doubt that undue pressure for completion will injure the quality of the sheets remaining to be done. Owing to this pressure, I had recourse some time ago, but only as an experiment, to a firm in London to push on the work. Some of the work done by them had not in 1899 turned out as satisfactory as had been expected. Unless their work has since considerably improved, I think that this mode of accelerating the hill engraving should be abandoned, and that more young engravers should, if possible, be trained to this duty by the Survey itself.

Specimens of the English hill-maps are in the portfolio. For the South of England the hills can be printed either in black or brown from the copper plates. For that district the hill features have since 1889 been engraved on separate plates, and this system will be continued as far north as South Lancashire and Yorkshire.

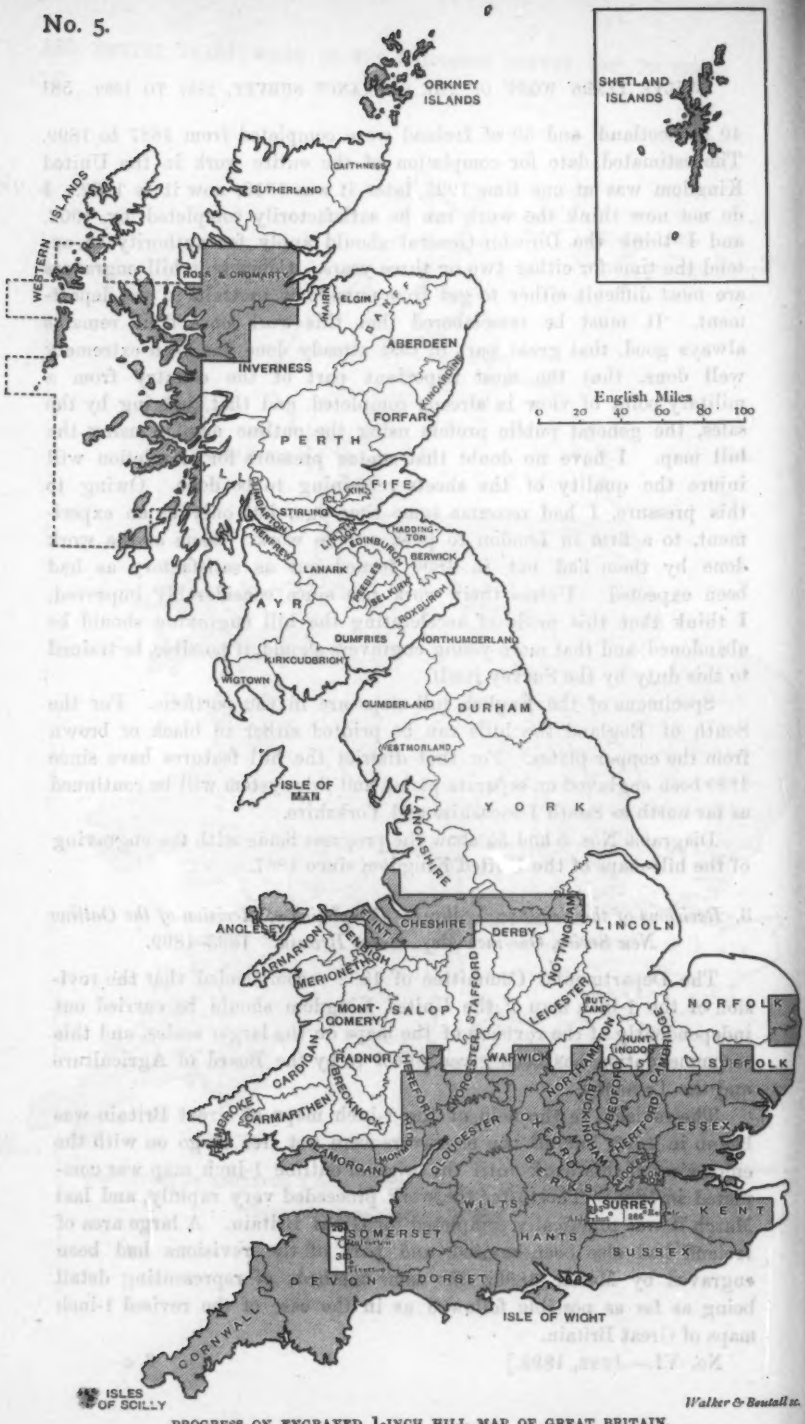
Diagrams Nos. 5 and 5A show the progress made with the engraving of the hill-maps of the United Kingdom since 1887.

3. *Revisions of the Small-scale Maps. Completion of Revision of the Outline New Series, One-inch Map, Great Britain.* 1893–1899.

The Departmental Committee of 1892 recommended that the revision of the 1-inch map of the United Kingdom should be carried out independently of the revision of the maps on the larger scales, and this recommendation has been given effect to by the Board of Agriculture and the Treasury.

The revision in the field of the 1-inch maps of Great Britain was begun in 1893, but all the engravers were not free to go on with the engraving of this work until the original outline 1-inch map was completed in 1896. Thereafter the work proceeded very rapidly, and last March it was practically completed for Great Britain. A large area of Ireland had also been revised, and part of the revisions had been engraved by March, 1899; the same methods of representing detail being as far as possible followed as in the case of the revised 1-inch maps of Great Britain.

No. 5.



Walker & Boutall sc.

PROGRESS ON ENGRAVED 1-INCH HILL MAP OF GREAT BRITAIN.

Engraved and published 1887 to March, 1899, ▨

No. 5a.

COMPLETION OF ENGRAVED HILL-MAP OF IRELAND.

Engraved and published 1887–95, ■

Sir Charles Wilson's original estimate for this work was only for a revision of the 1-inch maps of Scotland and of about two-thirds of England and Wales, the rest of England and Wales to be completed more gradually. But it seemed to me that an excellent opportunity now presented itself for obtaining a 1-inch map on the same uniform lines, and nearly up to date, for the whole of the United Kingdom. The Board of Agriculture readily concurred, and obtained the sanction of the Treasury to this work being carried out at once to completion, not only for Great Britain, but also for Ireland.

Diagram No. 6 shows the area of 1-inch revision of Great Britain completed from 1893 to 1899. It amounts, as above stated, to practically the whole of the area of Great Britain, only some five or six sheets in the Midlands remaining to have the engraving completed on March 31, 1899.

4. *Revised 1-inch Maps of Scotland, Ireland, and the North of England, with Hills in Brown.* 1898–1899.

The revision of the 1-inch maps of Scotland and the north of England was only carried out on the outline copper plates, and not on the hill copper plates, which contained both names and detail. To have carried out the revision on these hill plates would not only have doubled the cost of the engraving but would have damaged the hill features. On the other hand, if these hill-sheets are unrevised, they will go out of use, and their original cost will be thrown away. The difficulty has been got over by preparing one zinc plate with the hills only, and another zinc plate with only the revised detail and the names. From these two zinc plates, by double printing, a map is obtained containing both the hill features and the revised details. As the hills on this revised map are printed in brown, it is in many respects clearer than the original engraved hill-map, especially in the more mountainous districts, where the engraved hills, printed in black, although very artistically executed, are extremely dark, and obscure the names and detail. The revised map also has the contours, which the original hill-map has not.

Two specimens of Sheet 54 Scotland ("Loch Rannoch"), one being the original unrevised sheet with the hills in black, the other being the revised sheet with the hills in brown, can be compared in the portfolio of English maps. This map should be pushed on rapidly for Scotland, the North of England, and Ireland, as the revision of the 1-inch maps in the case of those countries or districts cannot be considered complete until it is done. Only a few sheets of Scotland had been published on March 31, 1899 (see Diagram No. 7).

5. *Progress of One-inch Coloured Map. England and Wales.* 1893–1899.

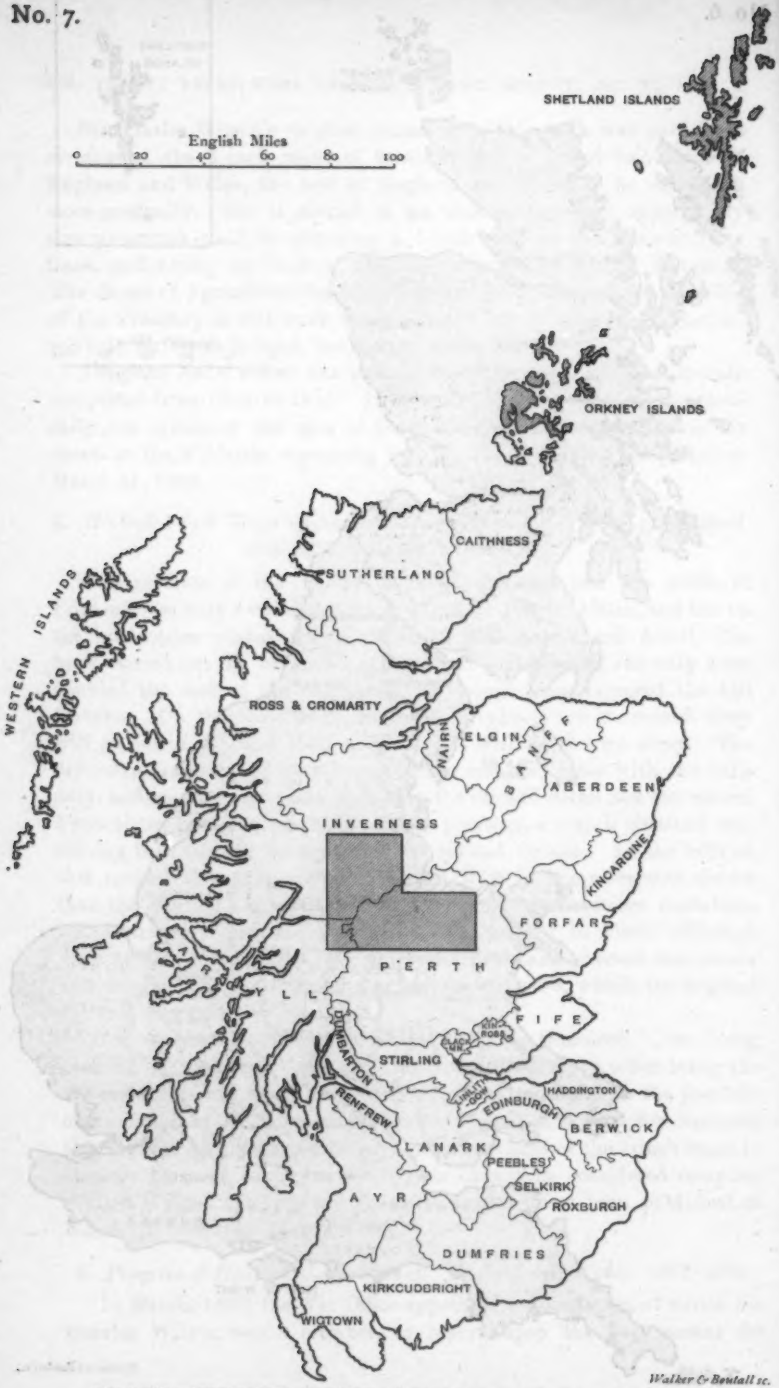
In March, 1892, the War Office appointed a Committee, of which Sir Charles Wilson was a member, to report upon the best means for

No. 6.

REVISION OF ENGRAVED 1-INCH OUTLINE MAP OF GREAT BRITAIN.

Revised and published 1893 to March, 1899.

No. 7.



Walker & Boutall sc.

SCOTLAND: PUBLICATION OF REVISED 1-INCH MAPS, WITH HILLS IN BROWN.

Published 1898 to March, 1899.

obtaining a military map of the United Kingdom, and in April, 1892, the Board of Agriculture appointed, as has been stated above, a Departmental Committee to report upon the work of the Ordnance Survey generally. Both committees agreed that the military map should be based upon the 1-inch map of the Ordnance Survey, which should be printed in five or six colours, and that it should be on sale to the public. They also agreed, with some minor exceptions, as to the details which should appear on the map. The Treasury at first refused to appropriate any money for this coloured map, but General Sir Redvers Buller, who was then Adjutant-General, and who is a strong advocate of maps in colour, brought pressure to bear on the Treasury, and obtained permission for me to divert £500 of the Survey Vote to making an experiment in the preparation of 1-inch coloured maps. Later on, the Treasury, on the recommendation of the Board of Agriculture, sanctioned the preparation of these coloured maps as part of the regular work of the Survey; the map was not, however, intended to extend beyond the southern counties of England, until it should be seen whether it would be taken up by the public.

But colour printing from zinc or stone was till recently comparatively unknown on the Ordnance Survey, and practical difficulties arose in organizing a staff for carrying it out. The earlier maps produced were not satisfactory, but a considerable improvement has since been effected. Two specimens of these maps, one being an early sheet containing Margate, and the other being the Shaftesbury sheet, which was one of the last done before I left Southampton in March, 1899, are in the portfolio of English maps. The latter is a great improvement on the former, and is a good clear map. Diagram No. 8 shows the progress which had been made in the preparation of these 1-inch coloured maps up to March 31, 1899.

6. *One-inch Civil Parish Map in Colours for Great Britain.* 1898–1899.

Another experiment in colour printing has been the production of 1-inch maps for civil purposes with the parishes shown in colour. They are also used as indexes for the 6-inch and 25-inch maps, and are on sale to the public, but enough time has hardly yet elapsed to show whether they will have any sale as maps. Two specimens, one for England and one for Scotland, are in the portfolio of English maps.

When the next census comes, these 1-inch maps, and a general map in colour on the scale of 2 miles to an inch for each county of England and Wales, a specimen of which was prepared in 1898, may be found to be not only useful but necessary. The latter map was prepared at the instance of the Board of Agriculture. Both maps ought to be of great service for all purposes connected with local government, although, as is mentioned elsewhere, the Local Government Board, the department principally concerned, appears rather to dread than to

No. 8.

Walker & Boutall sc.

PROGRESS ON 1-INCH MAPS OF ENGLAND AND WALES IN COLOUR.

Published in colour 1894 to March, 1899, ■

welcome the use of any kind of maps for either its local government or its boundary purposes.

Diagram No. 9 shows the progress which had been made up to March 31, 1899, on the publication of this civil parish map.

7. *Maps on Scales smaller than* 1-*inch to a Mile.*

As to these, the present instructions of the Survey include only engraved 4-mile and 10-mile maps. Both of these already exist for England and Wales and for Ireland, principally based on the old 1-inch maps, and consequently not up to date, while the 10-mile maps were only published as indexes to the 1-inch map. Neither could be revised until the revision of the 1-inch map should be completed. That is now done for England and Wales, and in 1898 the revision of the 4-mile map of England and Wales was approved, and the drawing begun. The execution of the original map on that scale was excellent and up to the highest standard of engraving, and, as it would have been hopeless to get a better executed map at the present day, while the most important detail on the original map still remained good, it was decided to revise the old map instead of making an entirely new map. In view of future colour-printing, the size of the old sheets had to be reduced, and the new sheet lines were made to coincide with the sheet lines of the new series 1-inch map; it was also decided that third-class roads should be shown in addition to the first and second class roads, and that the hill features should be represented by hill-shading, and not by contours. These decisions were arrived at after consultation with the War Office, which places considerable importance upon this 4-mile map. As the outline edition must precede the hills edition, no decision was come to, or was in 1898 necessary, as to the method of hill-shading to be adopted for this map; nor am I aware that any decision has yet been arrived at; but I very strongly hope that the hill-shading will be by engraved vertical hachures. This course, in addition to being, I believe, the best method of representation, would have the additional advantage of continuing for a time the employment of hill-engravers, who are, as already stated, so much required for the completion of the hill-engraving of the 1-inch map. I hope, also, that this revised 4-mile map in outline will be pushed on as rapidly as possible; the original map in outline, even when published unrevised some years ago, has been one of the most popular maps ever published by the Survey, and in its revised state there is every probability, for various reasons, of its becoming even more popular.

As to the revised and engraved 4-mile maps of Scotland and Ireland, and as to the maps of the three kingdoms on the scale of 10 miles to an inch, they are still entirely for future execution, and do not come within the scope of this paper.

No. 9.

Walker & Boutall sc.

PROGRESS ON 1-INCH COLOURED PARISH MAP OF GREAT BRITAIN.

Published 1898 to March, 1899,[redacted]

A good deal of the revised 4-mile map of England and Wales had been drawn under the above decisions, and some of it had been engraved, before March 31, 1899, as shown on the accompanying diagram, No. 10.

Specimens of the old and of the revised 4-mile map are in the portfolio of English maps. The engraving in both cases is above the average in quality. The old sheets contained an area of about 120 miles by 90 miles. The new sheets contain an area of about 90 miles by 60—that is, they each include 25 sheets of the new series 1-inch map.

There are also specimens in the portfolio of the unrevised engraved 4-mile maps of Ireland, of a photozincographed (temporary) 4-mile map of Scotland, and of the 10-mile maps of the United Kingdom which were engraved as indexes to the 1-inch maps.

IV. General Observations.

1. *The Use of Ordnance Maps by Public Departments and the General Public.*

The Public Departments which mainly use the Ordnance maps are the War Office and the Admiralty. The Foreign and Colonial offices have also of late years shown a greatly increasing appreciation of maps specially produced for them by the Ordnance Survey. The curious circumstance is that the department, the Local Government Board, which is most concerned with local areas and their boundaries in England and Wales, and to which for good administration good maps are absolutely essential, appears to have the greatest dislike of all kinds of maps in connection with both Local Government areas and their boundaries. It is probably not too much to say that the chaos of different local areas and authorities under which England has been labouring for many years, and from which it is only now beginning to emerge, is due to the timidity of this public department, and to its reluctance or incapacity to make any intelligent use of maps. Scotland is not much better off. Ireland is, in fact, hitherto the only one of the three countries in which the public gets full practical benefit from its Ordnance maps. There the whole of the valuation of the country, and all decisions as to the boundaries of the Local Government areas, are by legal enactment based on the Ordnance Survey maps; while under a system organized some forty years ago by Colonel, now Sir George, Leach, upwards of five thousand estates have been mapped by the Ordnance Survey for the Land Judges Court. A similar Ordnance Survey organization should undoubtedly have been adopted for the system of Land Transfer by maps, which has been recently introduced in London, but other influences were too strong. A new Government map-making organization has thus been established for carrying out work identical with that of the Ordnance Survey, with the certain result that the cost of both organizations will be largely increased, accompanied by an unnecessary addition to the cost of land transfer.

No. 10.

PROGRESS ON NEW 4-MILE MAP OF ENGLAND AND WALES.

Revised and engraved 1899 to March, 1899, ▨

As to the published maps of the Survey on sale to the public, I hope they will always be limited to the scales and forms at present authorized, and that maps on all other scales and in all other forms will continue to be left to private enterprise. The publication branch of the survey at Southampton is becoming over-weighted with the work already allotted to it, while efficient firms of map publishers like Messrs. Bartholomew and Stanford are well able to supply the public with maps on other scales based on those of the Ordnance Survey. It seems to me to be in accordance with public policy that they should be encouraged to continue the production of all such maps, if not even, in case of necessity, to assist the Survey in the publication of its own maps. Inferior productions on the other hand, which are, unfortunately, numerous, should be discouraged as much as possible.

2. *Style and Quality of the Ordnance Maps.*

Time only allows a very brief allusion to this point. The general principles followed hitherto by the Ordnance Survey Department have been the following:—

1. That the accuracy of its maps is the first consideration.

2. That for scales larger than 1 inch to a mile, the more rapid and cheaper processes of printing from zinc or stone are, in nearly all cases, sufficiently good for all practical purposes, and are practically enforced on the Survey by considerations not only of time and cost, but also by the limits imposed by the number of available copper-plate engravers, and by the extent of the publication establishments at Southampton and Dublin.

3. But, on the other hand, for maps on the 1-inch or smaller scales, copper-plate engraving is in the first instance essential both for clear outline and for the hill features, whether the printing is done from the copper direct, or by transfer to stone or zinc; and the engraving for these scales should be maintained at the original survey standard.

4. It follows that the engraving of these small-scale maps should not be unduly hurried; and this applies more particularly to the hill engraving, which is a permanent work, and which should be completed with as great perfection as possible, the estimated time of completion (1902) being extended if necessary.

As to this point of hill engraving, the system introduced in 1889 by Sir C. Wilson of engraving the hills on separate plates is no doubt open to minor objections, but it has been rendered indispensable by the recent demands for coloured 1-inch maps with the hill features.

As to the principles above stated, they will, I think, be found to be supported and corroborated by an examination of the maps of foreign countries. The best of these foreign topographical maps are in every case first produced by copper-plate engraving, both of the detail and of the hill features.

3. *Sale of Maps.*

On January 1, 1897, the charge of the sales of the ordnance maps was, in accordance with the recommendations of a Departmental Committee, appointed by the Board of Agriculture, and of which Mr. Hayes Fisher, M.P., was chairman, transferred from the Stationery Office to the Ordnance Survey Department. This change was mainly owing to the general complaints from the bookselling trade in England, and from professional men all over the country, that they could only get maps by sending to London for them. The results have hitherto been distinctly successful. The net value of the sales increased from about £17,700 in 1896–97 to about £23,750 in 1898–99, an increase of about 33 per cent. in two years. But another branch of the new system, that of sales through post-offices, has distinctly failed. I believe the reason to be that the Postmaster-General offers entirely inadequate remuneration to the postmasters for the rather complicated work they have to do under the rules laid down.

4. *Organization of the Department.*

This has now stood the test of the experience of a hundred years, and although the Ordnance Survey has been successively attached to four different public departments, viz. the Board of Ordnance, the War Office, the Office of Works, and now to the Board of Agriculture, its organization throughout has remained practically unchanged. The Board of Agriculture has taken, and takes, a keen interest in the work of the survey, and this interest has in various ways benefited and advanced the work of the department. But in the future this very interest may easily entail not only that advantage, but the disadvantage of undue interference as to the details of administration. So long, however, as an administrator of the strong practical common sense of the present (1899) President of the Board of Agriculture remains at the head of affairs, this danger is unlikely to arise. Nor, under the same condition, is it likely that the present organization of the survey, or its system of pay and discipline, will be seriously interfered with.

That organization is, so far as I know, absolutely peculiar to the Ordnance Survey as a branch of the public service. Its basis is a military establishment of some 20 officers and some 400 or 500 non-commissioned officers and men of the Royal Engineers. To this military establishment are attached at the present time about 2000 civilians. The civilians vary as to class from unskilled labourers, at the bottom of the tree, to a few able and superior public servants at the top. Nearly all the men employed, military and civilian, are trained to their survey duties by the Survey itself. For the field work, which is the basis of the Survey, with its frequent moves from district to district or from country to country, the military element is manifestly invaluable, if not

indispensable. On general grounds also its value is steadily increasing, in view of the principle which appears now, with the sanction and encouragement of most of our modern members of the House of Commons, to be in course of rapid application to those branches of the Civil Service which have most Parliamentary votes—the principle, namely, that the general tax-payer ought to pay to his civil servants of those branches the maximum of pay and pension without much regard to the value of the work rendered in return.

5. *Future Work of the Survey.*

There is still very important survey work remaining to be completed. I should myself place first in importance the completion of the edition of the revised maps of Great Britain, with the hills in brown, followed by similar work in Ireland; until this is done, as has been already mentioned, the 1-inch revisions cannot be considered complete. Next in importance, I should place the completion of the revised 4-mile and 10-mile maps in outline of the United Kingdom. As to the 1-inch coloured maps of England and Wales, they are mainly required only as military maps of the district south of a line running east and west through Cardigan, and it still remains to be seen whether they will be popular with the public, while as to the hill-engraving of the 1-inch map of England and Wales, its rate of progress and date of completion should, as has been stated above, be made entirely dependent on good quality being ensured. As to the large-scale revisions, the heavy expenditure on them will always require that close attention should be paid to the rate of progress.

But as to the completion not only of the work now in hand, but also of any new work which the Board of Agriculture and the Treasury may sanction for execution by the Ordnance Survey, I cannot be wrong in assuming that in the hands of my successor, Colonel Johnston, R.E., the reputation of the Survey for good work honestly carried out will be fully maintained.

Colonel Johnston: I have only a very few remarks to make on the excellent paper we have heard. I must say, in the first instance, that I am very glad it has been read, as it could not have been in better hands, and the present is a very good opportunity for reading it. The Survey, until a few years ago, was concerned mainly with large-scale work; of late years, more especially during Sir John Farquharson's time, a very great deal of attention has been paid to the small or geographical work of the Survey, with which this Society is more especially interested. I may say I fully endorse the view of my predecessor as to the importance of this small-scale work. An advantage that I hope may arise out of this paper is, that we may get suggestions as to improvements in the survey maps, as the department has always shown itself willing to listen to suggestions or criticisms as to the maps produced. We shall be very glad to receive any to-day from members of this Society; especially I shall be glad to receive them as regards the

coloured maps, to which Sir John Farquharson referred. The coloured map will very shortly be completed south of a line, speaking roughly, running from Ipswich to Cardigan. A considerable number of sheets are already published, but so far the sale has not been very great. It may be that the public do not know of them. I would like to remark on one or two points raised. Sir John Farquharson referred to the dead weight of the town surveys; in the past that has been a dead weight on the Survey, and I am bound to say, if the revision and resurvey of towns had continued, it would have prevented the Survey doing much other valuable work. At present we are not severely pressed in that way; Carlisle and Cardiff are nearly completed, and Aberdeen and Dundee are both in progress. As regards Ireland, the difficulty in the resurvey is very great. The fourth division, to which Sir John Farquharson referred, has not been formed owing to the calls on the Ordnance Survey due to the present war. As soon as it is over, and we get fully established again, I hope the fourth Irish division will be formed. On the other hand, the revision of Great Britain has so far progressed, that it has been possible to transfer one division from England to Ireland. As regards hill engraving, I may say that the measures taken by Sir John Farquharson have been extended, and I hope that, without any loss of quality, the 1-inch hill map will be completed by 1902, or very soon afterwards. As far as I am concerned, there is no intention of sacrificing quality in any way. It may be of interest to indicate what the Survey has done since Sir John Farquharson's time. As far as the large scale is concerned, practically the whole of England is within the twenty-years limit; that is, no appreciable number of counties have surveys over twenty years old. Scotland is not quite so satisfactory, but the few counties with older surveys are being taken up. The 1-inch revised map of Great Britain was completed last year. We are getting on with the 1-inch revised map of Ireland as fast as possible; the work has been extremely heavy. The present is based on an old survey, and the alterations are extremely heavy; the field work, drawing, and engraving have been very slow, but a quarter of the country has been done. The work is being pushed on as rapidly as possible. In England the 1-inch hills have been already alluded to; we have prepared revised hill sheets for a third of Scotland, and I hope in a year the whole of Scotland will be published. As the revision of the 1-inch map of Ireland is completed, so will the revised maps with hills be completed; it will go on *pari passu*. The revised 4-mile map is being engraved as fast as is consistent with good work. I hope within a year's time it will be practically completed. Engraving the 4-mile Scotland has been commenced, and that will go on as rapidly as possible. Ireland will follow. It has not been possible to do anything with the 10-mile map yet, as it has been thought better to concentrate our efforts on the 1-inch and 4-inch scales. There is one other work I should refer to; it has been heavy—that is, the work for the War Office. Ordnance Survey officers and men have been sent to South Africa for survey work, in addition to others for ordinary Corps work, and the result is we are extremely short. In other ways we have been drawn upon, by men of the reserves and volunteers being called out for army service, and we have had very heavy demands by the War Office for maps; so far we have been able to meet them. I don't think I have anything more to say, except that there is every intention on the part of the Ordnance Survey that its reputation for accuracy and good work shall be maintained.

Sir CHARLES WILSON: I wish to express my concurrence in Sir John Farquharson's excellent epitome of the work of the Survey to the present time, and to say how perfectly I concur in his estimate of the services rendered by General Cooke to the Survey, which have never been sufficiently appreciated. I should also wish to mention what Sir John has not been able to allude to himself, that he

conducted the affairs of the Survey during his period of office in an admirable way. He had many difficulties to contend with, and I think he steered through all of them in a most successful manner. One difficulty the Survey has had to contend with in any new departure has been that of getting people in the different departments of the Government to understand what maps are and what their uses may be. As long ago as 1883, when I had charge of the Irish Survey, I was struck by the great expense to which landed proprietors in Ireland were put in selling their property. They often had to have 25-inch surveys made for the purposes of the court, and had to pay the whole of the cost themselves. I then advised the commencement of a 25-inch survey of Ireland, and was strongly supported by the boundary commissioner, Sir John Ball Green, and by the authorities of the law courts, but the Government would have nothing to do with a large-scale survey in Ireland. When I was appointed director-general I again took up the question, and with very great difficulty was able to persuade the Treasury that a 25-inch survey was absolutely necessary to enable the terms of the Land Acts for Ireland to be carried out. Exactly the same difficulty occurred afterwards with regard to the revision. It is impossible to get officials to recognize the absolute necessity of having accurate maps. At first only a small sum was allowed for revision; but gradually, when questions were asked in Parliament, the vote was increased, and at last continuous revision was authorized. I am glad that such excellent progress has been made in the revision. I am quite sure, from what I know of the present director-general, that the reputation of the Survey will not suffer in his hands, and that he will meet any new departure or any questions that may arise in the best possible way.

Lord BELHAVEN: Sir John Farquharson said the Local Government Board did not make much use of the Ordnance Survey maps, but certainly those who work under them use the Ordnance Survey maps on every possible occasion. For instance, the County Council to which I belong: we have to pay for them ourselves.

Mr. HUGH LEONARD: I may be permitted to say that I think, if the Survey Department took a little more trouble in making known what maps they have for sale, there would be a much larger sale of their maps than there is now. I have been connected with maps for many years, and was not aware that there is a coloured 1-inch map published until to-day. We have had a great deal of information given to us with which I was not acquainted, and I think if any reasonable means were taken to let the public know what is going on, the sale would be increased, and the maps would thus be made more useful to the country, which has to pay for them in the end.

Mr. DOUGLAS FRESHFIELD: Having represented the Royal Geographical Society eight years ago, when the Council made representations regarding the Ordnance Survey maps, I think that we, who belong to the Society, may congratulate ourselves on the very great extent to which the recommendations I was authorized on behalf of the Society to make have been carried out. In the important matter of the use of colour in maps, it appears that great progress has been made. We have heard that there is a very small sale for coloured maps; this arises from want of knowledge by the public. I am convinced that the Ordnance Survey Department are now doing everything they can under the conditions in which they live; they have the same enemy that Lord Salisbury lately mentioned—the Treasury, and the Treasury is encouraged in its traditional policy by the extreme apathy and want of knowledge of the use of maps, which is not confined to the Government departments, as one of the speakers suggested, but extends through the whole nation.

Dr. A. J. HERBERTSON: In the first place, I would suggest that it should be

compulsory for every head post-office to have an Ordnance map of the district framed and hung up on the walls. In the second place, it would be desirable if the Ordnance Survey could issue maps to schools at a cheap rate, in the way the American Government has arranged, where the maps are sold to teachers for school purposes at the cost of printing and paper; I think that would contribute to the popularization of maps, and would very much help all schoolmasters, who find the expense of buying maps very heavy.

Sir JOHN FARQUHARSON: I had something to say to you about the sales of Ordnance maps, but I began to think the paper was very long, and perhaps you would be getting tired of it. Roughly, it was that the Survey had had the sales in charge since 1897. Formerly it was in the hands of three agents, as you know—Stanford for England, Menzies for Scotland, and Hodges and Figgis for Ireland; but the Ordnance Survey took it up in 1897, and the results of that change have been distinctly successful. The value of the increase of sales was, after two years, about thirty-three per cent. But another branch, that of sales through the post-office, has distinctly failed. I believe the reason to be, as is stated in the paper, that the Postmaster-General offers inadequate remuneration for the complicated work the postmasters have to do. I think that you can get the Ordnance maps at a post-office in a fairly large town, if there is no local agent there for the sale of the maps; but the postmasters have to write such complicated forms that very often they make mistakes, and it is as troublesome to the Southampton people as it is to the postmasters themselves. Then, I think, the postmasters are only paid the fraction of a penny, in the same way as with money orders, and the result is that the postmasters don't care for the work. As to making the maps known, I think you will find that in places where visitors go, the local bookseller has a local map of his own that he wants to sell, and if you ask for a map of the district you will seldom be shown an Ordnance map, but a rough map that he has had compiled himself.

The PRESIDENT: The meeting will wish to pass a vote of thanks to Sir John Farquharson for reading his paper, and for his kindness in bringing these interesting foreign survey maps here, which he will allow to remain for a few days, so that a number of people who are interested in them can examine them in detail. The most interesting part of the paper to us, and all those who care for the spread of geographical knowledge, is the paragraph on the sale of maps. It is much to be deplored that the system of sale through the local post-offices has failed, owing to the obstruction and the want of interest in the matter at the General Post-office. Of course, if the postmasters were properly remunerated, the sales by that means, I cannot doubt, would be very large indeed. Since I was examined by the departmental committee of the Board of Agriculture, I have had a register kept of the number of people who come to examine the Ordnance Survey maps in this room. It is very large comparatively; it goes on increasing year by year, and I have very little doubt that most of those who come here afterwards buy the maps. It would not be of much avail, I think, to advertise very largely, as the advertisements would not be seen. I don't see any means of making the existence of coloured maps better known than those used by the different agents of the Survey Department. I now ask you to pass a vote of thanks to Sir John Farquharson for his very interesting paper, and for kindly showing us these foreign maps.

EXPLORATION OF THE BERMEJO RIVER AND ITS AFFLUENTS, ARGENTINE REPUBLIC.*

THE expedition started in two boats, each 27 feet long by 7 feet beam by 3 feet deep. One was built at the Ingenio La Esperanza, having been designed and its construction superintended by Mr. Stephen Leach; the other at San Loreno, designed by Mr. R. Smythe, and built by his carpenter. Both boats were made of algarroba timber and cedar planking, being copper-fastened throughout. The first was launched for trial on the represser at La Esperanza, and on March 1 she was duly christened *La Esperanza*, and again on March 5, on the river San Pedro, about two miles from the junction with the Lavalyen. The other on March 3 was launched in the river San Francisco, about 2 miles below where the San Lorenzo flows into it, and was christened the *Bertha*. There were, besides, three chalanas, 22 feet long by 7 feet beam by 1 foot 9 inches deep, especially built in Buenos Aires for the expedition, from a design and by the order of his Excellency the Minister of Marine, Commodore Rivadavia, and sent overland by rail as far as the station Pampa Blanca F.C.C.N. (Central Northern Railway), and thence to the river in carts. One, the *Ledesma*, was launched on the river San Pedro at the same time as the *Esperanza*; the other two, the *Lavalyen* and *Sora*, were launched on the San Francisco at the same time as the *Bertha*.

On March 4, 1899, the two boats *Esperanza* and *Ledesma* left the Ingenio La Esperanza on carts to be launched at the Paso del Piquete, about a mile below the junction of the San Pedro and Lavalyen, which unite to form the San Francisco. As the road through the forest was found too narrow, trees had continually to be cut down to clear the way, making progress very slow, so that by sundown little more than half the distance had been covered, and a halt had to be called for the

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* Map, p. 680. The following letter, dated "Esperanza, San Pearo, Provincia Jujuy, Republica Argentina, October 28, 1899," from Mr. Walter Leach, accompanies this paper:—

"Thinking that they may be of some interest to you, I am forwarding with this report of an expedition made by myself and various others, whose names appear in the report, and plans of the rivers whose course we followed.

"The idea of the trip originated through a desire to see if these rivers were not navigable, and so facilitate the carriage of the products of these northern provinces.

"The report and plans have been drawn up by Captain H. Bolland, master mariner of the British Mercantile Marine, who accompanied the expedition, taking with him all instruments necessary for taking observations, which I think you may be satisfied are correct. A sketch of this river with its curves and length of reaches was kept all through.

"If you wish for any further particulars, kindly address me here or write my brother Thomas Leach, the Harridge, Rochdale, Lancashire.

"I am, yours faithfully,
"WALTER LEACH."

night. Some of the party remained with the boats; the others pushed on to Piquete, where the first camp of the expedition was formed, lat. 24° 17′ 55″ S., long. 64° 41′ 40″ west of Greenwich.

March 5.—At daybreak work was resumed, but progress was very slow. By about 4 p.m. a place was reached where the road passes close to the river San Pedro. It was resolved to launch the boats then and there, which was successfully accomplished. Mr. Walter Leach taking command of the *Esperanza*, and Mr. Stephen Leach the *Ledesma*, proceeded with a few men down the San Pedro into the Lavalyen and the San Francisco, and arrived at the Piqueto camp at dusk.

March 6.—At 6 a.m. the camp was broken up and the boats ready to start. The *Ledesma*, drawing about 10 inches, with Mr. S. Leach and Captain H. Bolland, led the way, followed closely by the *Esperanza*, drawing about 12 inches, with Mr. W. Leach and Captain L. Zorilla. After grounding several times, a stop was made for breakfast on the shore, and after another pull in the afternoon, Mr. R. Smythe's camp was reached at about 5 p.m. Here was the other contingent of the expedition, with the boats *Bertha*, *Sora*, and *Lavalyen*.

March 7–13 were spent in the Sora camp, a place actually about halfway between the rivers San Lorenzo and Sora on the left bank of the river San Francisco, in front of Bella Vista, lat. 23° 53′ 41″ S., long. 64° 36′ 0″ west of Greenwich. The delay here was made to organize the expedition, to fit out the boats with all necessary gear to protect their crews as much as possible from the sun and rain, to load the provisions required for three months, and sufficient ammunition for defending the expedition in case of an Indian raid. Each boat was furnished with a Winchester rifle, a machete, a mosquito net and veil, and plates, cups, etc., for each one of its crew. Also two spades, two axes, two pickaxes, mast and sail, sun and rain awnings, a small tent, oars, rudder, anchor, lamp, and everything requisite to make the trip as comfortable as possible. Distributed amongst the boats were also a set of carpenter's tools, cooking-utensils, canvas, oakum, pitch, nails, screws, tacks, and all necessaries for making repairs. The provisions consisted of salt meat, boiled beef, vegetables, rice, beans, tea, coffee, sugar, yerba, and oatmeal, all in watertight casks or tins. Bread and salt were the only articles in bags and liable to be spoilt. The instruments included a chronometer, sextant, velometer, barometer, thermometer, compass, and theodolite. A medicine-chest was supplied with instruments and medicines, and a very liberal quantity of medical comforts, such as Liebig's extract of meat, cornflour, condensed milk, cocoa, and oatmeal biscuits. Also one large duck-gun, two German Mausers, and several fowling-pieces. Each man carried a large knife and revolver. The boats were numbered in the order in which they had to proceed, as follows: No. 1, chalana *Ledesma*, draft 14 inches: in this were H. Bolland and L. Zorilla, nautical men, who together piloted

the expedition; also W. Paterson, doctor. No. 2, *La Esperanza*, draft 20 inches, with W. Leach, chief of expedition. No. 3, chalana *Sora*, draft 13 inches. No. 4, *Bertha*, draft 22 inches, with R. Symythe, second chief of expedition. No. 5, chalana *Lavalyen*, draft 11 inches.

Boats were tried with their respective crews, and two small 6-foot punts sent up from Buenos Aires were annexed. While in this camp rain was experienced on various occasions, generally during the night.

March 13.—Cloudy, with light north-east wind. At 11 a.m., the boats being loaded and everything ready, a start was made, each boat following in order as numbered, the *Esperanza* towing one of the punts, the *Bertha* the other. No great progress had been made before one or other of the boats began to get into difficulties, either by grounding or running against a snag, and causing a general delay, as all the other boats had to wait or send assistance. The *Esperanza*, fouling a snag, capsized her punt, which got adrift, but was recovered by the *Ledesma*. Shortly afterwards the *Bertha* followed suit; her punt, when recovered, was so badly damaged that it had to be taken on board. Several articles were lost or damaged; amongst others, a box of signal rockets. At 4 p.m. camp was pitched for the night on the left bank of the river, a little above the arrayo Sancelito. Some of the members slept on board the boats; the others on shore, in tents.

March 14.—Cloudy morning. Thunderstorm with rain during night. Here the two punts were abandoned, being left on shore, made fast to trees. At 7 a.m. broke camp and proceeded, boats continually getting into difficulties as yesterday. During the afternoon, the *Bertha*, while following the *Ledesma* through one of the numerous false channels, got badly aground, and had to be partly discharged to lighten her. She was hauled over the bank by tackles, working until dark with crews of *Esperanza*, *Ledesma*, and *Lavalyen*. The *Sora* was the only boat that took the right channel, but in doing so, nearly capsized on a snag. The *Esperanza* got through by taking a very narrow branch, where a tree that obstructed the way had to be cut in two. At dark camp was formed, *Ledesma* and *Lavalyen* remaining where *Bertha* was aground, *Esperanza* about quarter of a mile further down the river, and *Sora* in the other channel.

March 15.—Cloudy morning. Little rain during night. By 8 a.m., *Bertha* having been floated and reloaded, a start was made. Picked up *Esperanza* and *Sora* a little lower down, where they were in readiness to proceed. After grounding several times, about 3 p.m. arrived at a very shallow branch, where all the boats, except *Ledesma*, returned upstream about half a mile to come down another channel. *Ledesma* was sent on to see if another channel was practicable. She grounded several times, but eventually got past, and later on was joined by *Bertha*, and camp was made for the night. The other boats remained above the pass.

March 16.—Light southerly wind, and fine. At 7.30 a.m. the

Esperanza, *Sora*, and *Lavalyen* arrived at the place where *Bertha* and *Ledesma* were camped, having taken the same channel as the *Bertha*, and passing without any difficulty. To-day boats kept better together and got into less difficulties. At 4 p.m. came to a shallow pass where all boats grounded. On getting afloat, camped all together.

March 17.—Cloudy morning, with rain. At 6 a.m. left camp, but grounded soon afterwards for a short while, boats getting together again almost immediately. On leaving the coast where they had stopped to get together, the *Lavalyen* fouled a snag and capsized, floating about half a mile down-stream bottom up. She was eventually righted, the sand that in such a short time had almost filled her, cleaned out, and reloaded with the recovered articles. She lost some Winchester rifles, about 2800 rounds of ammunition; some of the crew's effects and provisions. She also had a plank stove in on starboard bow, but was soon repaired, so that in the afternoon progress again was made until about 4 p.m., when, coming to a bad pass, *Esperanza* grounded badly and could not be floated before dark. *Sora* and *Lavalyen* remained by her, *Ledesma* and *Bertha* passed and camped together about 500 metres lower down.

March 18.—Cloudy, misty morning. Rain during night. *Esperanza* and other two boats floated off easily (the river had risen some 6 inches), and got to where *Bertha* and *Ledesma* were camped. Remained all day in camp to dry clothes and rest.

March 19.—Fine morning. Left camp at 7 a.m., but grounded soon afterwards. *Esperanza* had to go for about a mile up-stream to take another branch. She did so, passing without any difficulty; all boats arrived about 4 p.m. at La Peña, where it was thought fit to remain, in order to replenish provisions lost when *Lavalyen* capsized, at Señor Pedro Romero's almacen, distant about half a mile, and to clean out, refit, and stow boats ready for entering the Bermejo.

March 20.—Cloudy morning. Very heavy rain and thunderstorm during night. Hauled *Bertha* and *Esperanza* on shore to examine their hulls, and wash them out. All boats were thoroughly cleaned out and re-stowed, and provisions replenished, thinking that on leaving here all traces of civilization would be left behind.

March 21.—Overcast sky, with fresh easterly wind. At 2.30 p.m., boats being all re-stowed and everything ready, a start was made for Las Juntas, where the San Francisco joins the Bermejo. The distance was covered in about an hour without any difficulty. Here the first rips were encountered, and the boats were in danger of being swamped by the waves. Camp was made on the right bank of the river San Francisco, about half a mile from its junction with the Bermejo. Lat. 23° 19′ 0″ S., long. 64° 4′ 56″ W. of Greenwich. From Paso del Piquete to the mouth of the river Ledesma, the San Francisco flows in a north-by-east direction at an average speed of about 4½ miles an hour, over a bottom of loose sand and stones. Its course winds, and in places

divides itself into numerous shallow channels, studded with a number of snags, which are continually being torn from its banks at this time of year, when the river is in a flooded state, and carried down by its current, to be arrested in their progress by the shallowness of the stream, and remain to form, in a very few days or perhaps hours, a bank of sand. By this means the river changes its course, and thus it is very easy to understand the obstacles this river puts in the way of navigation, and the reason of the continual groundings of the boats of the expedition. Likewise, it must be stated that the crews of the boats were not experienced men; some of them had never before pulled an oar or seen a boat.

The lower section of the river, from the mouth of the Ledesma to its junction with the Bermejo, flows in a north-easterly direction, at about the same rate, over a bottom of fine, loose sand. The water is of a reddish colour and thickly mixed with sand, which makes it unfit for drinking until allowed to settle. The river is very wide in places, sometimes as much as three-quarters of a mile between its natural banks, which are in most places low and marshy, covered in general with a stunted growth of timber. Heavier timber is seen in the background at no very great distance from its shores. It is in these wide places, divided also into several channels, shallow and full of snags, that navigation is so difficult, as the channels are ever shifting, from day to day, and it requires a quick and practised eye to choose the right branch. Frequently in this expedition the boats were carried down a wrong channel, having become unmanageable by their crews in the current, and they had to return several times to get into the right branch. In low river the navigation should be easier, as then the course would be better defined. Both banks are fairly populated. Every now and again animals were seen grazing and habitations passed; but cultivation seems scarce, owing probably to the difficulty of getting produce to a market.

Upper Bermejo.

March 22.—North-east wind, and fine clear morning. Left camp at 2.40 p.m., entering upper Bermejo a few minutes afterwards. At 4.15 p.m. camped for the night on the right bank of river. To-day several rapids and rips were passed, some of the boats shipping much water.

March 23.—Clear fresh morning. Soon after sunrise an earthquake was felt. It lasted several seconds, and was so severe as to disturb water in a bucket on shore, but no change was noticed in the river surface, although it was felt in the boats. After an early start, good way was made until about 2 p.m., when a place was reached where the river was about 2 miles broad, and cut up into numerous small channels, studded with snags, and interspersed with small islands and dry sand-banks. Took the left-side channel, in which very little water was found about 500 yards further down. So we had to return, hauling the

boats back by means of ropes made fast to the snags which divided this branch from the channel that skirted the left shore.

Eventually a way was cut through this barrier, allowing the boats to pass one by one into deeper water. Camp was here formed on left bank.

March 24.—Light southerly wind and clear weather. Got an early start from camp, but stopped about a mile further down at the puesto of Señor José Leon Tegueno (Luna Muerta), where some sheep were procured, and from an almacen distant about a mile inland, other articles.

At 11.45 made another start, and in about an hour regained the main channel of the river, which had been left on the previous day, just above the spot where the barrier of snags had to be cut through. More tide-rips and rapids were encountered to-day, but there was less grounding. At about 4 p.m. camp was formed for the night on the right bank.

March 25.—Strong south-east wind and cloudy, cold day. Left camp at 6.30 a.m., but little progress was made, the wind being nearly always dead ahead, and the boats could not make headway against it. At about 2 p.m. the spot was reached where the Teuco and Bermejo Central separate, the old course of the Bermejo Central being found completely dry. About 3 p.m. camp was made on a dry sandbank, in front of the high cliff (15 feet) of Pozo de la Orega. Here the channel is only about 80 yards wide, but very deep, and with a strong current running at the foot of the cliffs. This camp is in lat. 23° 34′ 45″ S., long. 63° 18′ 34″ W. of Greenwich. The upper Bermejo, from the mouth of the San Francisco to El Pozo de la Orega (where to-day the river Teuco may be said to begin), is at this season of the year, when the floods are at their height, a red-yellowish coloured stream with a current of about 4 miles an hour, maximum 5½ miles. Its course, for the first 15 miles, is in an east-north-east direction; then it turns sharply to the south-east, running in this direction, more or less, over a soft sandy bottom through a flat country. Its natural shores are as much as 2 miles apart in places, and are thickly wooded to the water's edge with fair sized timber. Although the shores in general are low and marshy, cliffs are occasionally seen to rise some 10 to 15 feet high, covered with detached clumps of trees and fine grass. The course of this river is continually crossing from shore to shore, often spreading out and dividing itself into numerous branches, intercepted by snags, dry sandbanks, and small islands. These channels have every appearance of constant shifting at this season of the year probably, but when the river is at its normal height, or low, they most likely unite in one good navigable channel for steamers of light draft, and, if once cleaned out, could possibly remain so with the continual traffic of steamers up and down. The old course of the Central Bermejo, where twenty years ago most of the water found its way from the river, was quite dry. To-day the

current strikes a cliff about 15 feet high, just above this spot, and cannons off to the left, striking the cliffs of Pozo de la Orega, of which it consumes large portions every year. During the nights of March 25 and 26, which the expedition spent in this locality, continual landslips occurred, and were heard falling down with a thundering noise and splash into the river below, and it is said that about a mile of these cliffs has been consumed by the river in the last ten years. The country through which it flows seems to be very fertile and fairly populated, as every now and again cattle, sheep, horses, and goats were seen grazing, while in the background the habitations of their owners were visible, some of them being of a very substantial kind, notably El Carmen, belonging to Señor M. Aparicio, situated on the right bank, about 7 miles from the mouth of the San Francisco. The water of this river is so thoroughly impregnated with a fine yellowish sand, as to render it unfit for drinking without filtering, and it cuts to pieces, in an incredibly short time, any machinery in motion with which it comes in contact. Rapids and tide-rips, forming big and dangerous waves, were not uncommon, endangering the boats several times by nearly swamping or capsizing them.

River Teuco.

March 26.—Fresh south-east gale, very cold, with rain. Moved camp to left bank of river, and a little further down, under the cliffs of Pozo de la Orega, where a landing-place was obtained. Some fresh meat was procured from the *puesto*. Several members are down with "chucho," fever and ague.

March 27.—Fresh south-east wind, very cold and cloudy, with rain. After breakfast weather moderated a little, so a start was made. Several tide-rips were passed. In one of these the *Bertha* lost one of her crew overboard, and in rescuing him was very nearly swamped. At 4 p.m. camp was formed on the left bank, the night-watches being doubled.

March 28.—Moderate south-east wind, and cloudy, with small rain. Left camp at 6.30 a.m. Half an hour afterwards encountered very bad tide-rips, and all the boats shipped quantities, greater or less, of water. The *Bertha*, getting broadside on, nearly capsized. About mid-day passed Paso del Milagro, where there are boats stationed for ferrying purposes; two hours later Paso del Siderio, where there is a ferry also. At 2.30 p.m. camped for the night at Señor E. Sarmiento's puesto, where fresh meat was procured. Here the Mataco Indian interpreter (Crguarez) and one of the members of the expedition left to go to the Colonia Rivadavia. Letters, too, were sent back by "chasque" (a messenger) to La Esperanza.

March 29.—Light south-east wind, and cloudy. At 9.30 a.m. left camp, passing the ferry Paso del Confite about twenty minutes

afterwards, and later on a Rancho with *chalanas*, no boats being seen further down the river. To-day saw Palo santo for the first time. At 4 p.m. camped for night on right bank of river.

March 30.—Light south-east wind, and cloudy. Rain during night. At 6.45 a.m. left camp, but had to stop from 7.30 to 10.30 for a heavy thunderstorm. To-day saw a few Indians on banks of river, fishing, but could not get near enough to speak to them, as they invariably hide themselves. At 4 p.m. camped for night at Port Belgrano, where Señor Tomas Ruiz has his establishment.

March 31.—Light south-west wind, and cloudy. Left camp at 8.50 a.m., passing a rancho on right bank, about 5 miles further down. Saw some Indians to-day, but could not get into communication with them. At 4 p.m. camped on left bank of river.

April 1.—Light south-west wind, and fine, cool morning. Left camp at 6.15 a.m. Saw various signs of Indians and several abandoned "toldos" in the forenoon. During the afternoon saw an Indian fishing; stopped and spoke to him. He recognized the chief of the expedition, Mr. Walter Leach, having been at the Ingenio La Esperanza. Sent him for his cacique (chief), whom he said was called Manuel. About an hour later Manuel arrived, accompanied by another chief, and said Cacique Sumaye had his *tolderia* about 2 miles further down the river. He was embarked on the *Ledesma* to point out the place, which was reached about 3 p.m. and camp made for the night. Soon after some white people, men, women, and children, came into camp, and said the place was called Belle-Ville. Numerous Indians also, with their families, who received presents, exchanging their weapons and wares for clothes, tobacco, etc. The cacique Sumaye, although known to the chief of the expedition, did not put in an appearance.

April 2.—Light south-west wind, and fine, clear morning. Indians brought goats and sheep into the camp, which was visited by the cacique Mariano (well known at La Esperanza) on horseback, and dressed in Christian garments. He was accompanied by some white men. As Sumaye had not turned up by 12.30 p.m., a start was made; three Indians, volunteering to proceed with the expedition, were embarked, two in the *Esperanza* and one in the *Bertha*. At 4.15 p.m. camp was made for the night on left bank.

April 3.—Light south wind, and fine, cold morning. Left camp at 6.30 a.m., and had not gone far when a tiger of the country, or jaguar (*Felis onza*), was seen on the left bank, and several others were shot during the day. No Indians were observed, nor traces of them. At 5 p.m. camped for night on right bank, finding it very difficult to get a suitable place, as the coasts are very little out of the water, and firewood very scarce.

April 4.—Light north wind, and cloudy morning. Left camp at 5.30 a.m. Saw and shot several tigers. About 7.15 a.m. came to a big

rapid (Salto de los Ingleses), and later in the day to a pass with only 3 feet of water in it, and which was named Paso Roca.

April 5.—Light south-west wind, and fine, fresh morning. Left camp at 6.30 a.m. Shot several jaguars, which seem to be plentiful hereabouts. Saw Palo mataco to-day for first time; also two Indians in the distance, but did not get near enough to them to converse. Camped at 4.30 p.m. on right bank.

April 6.—Light north wind, and fine, clear morning. Left camp at 6.10 a.m. Saw smoke rising in different places ahead, but some distance off; probably Indians setting fire to the long grass. While stopping for breakfast saw a number of Indians (Tobas) on opposite bank, but as they could not speak the national tongue, though four or five came into camp and received presents, little or no information could be obtained. About twenty minutes after a start had been made a small stream of clear water was passed, coming in from the south-west, which was taken to be the old course of the Bermejo Central in lat. 25° 36′ 20″ S., long. 60° 14′ 45″ W. of Greenwich. The shores are a little thicker wooded, but still very low. At 4 p.m. camped for night on left bank of river. The river Peuco, being simply a continuation of the upper Bermejo, is similar in many respects, the water being of the same yellowish-red colour, and thickly impregnated with fine sand. It runs in a south-east direction, more or less, at the rate of 4 or 5 miles an hour, through a somewhat flat country, over a bed of soft movable sand. From Pozo de la Orega as far as the Puesto of Senor Eugenio Sarmiento, in lat. 23° 47′ 20″ S., long. 63° 7′ 0″ W. of Greenwich, this river has all the characteristic resemblances of the upper Bermejo, at one time running in one stream between its natural banks, at another spreading out into numerous shallow branches intercepted by dry sandbanks and studded with large snags. The shores, too, have the same appearance, being low and wooded, with habitations here and there, having maize-fields attached, and domestic animals close by. Tide-rips, with their large waves, are too often met with, making it extremely dangerous for small boats. Several canoes and *chalanas* (flat-bottomed boats) are used for ferrying purposes, notably those at the Pasos del Milagro and Siderio. The channels here, too, have the appearance of shifting during the floods, but of being concentrated into one when the river is low, when they could be navigated by small light-drafted steamers.

From the puesto of Señor E. Sarmiento to Paso Rivadavia, so called after H.E. the present Minister of Marine, in lat. 24° 27′ 56″ S., long. 61° 35′ 28″ W. of Greenwich. This river changes materially, running now in one channel only, from 100 to 300 yards broad, and widening itself in short reaches and sharp bends between low thickly timbered banks. It runs at a rate of from 3½ to 5 miles an hour in a south-east direction, over a bed of soft sand and mud, similar to its

shores, which are low, and showed signs of having been recently overflown, the water-mark on the trees being some 5 feet above the ground. The depth, being apparently uniform and free from snags and rapids, is suitable for navigation by steamers of moderate size and draft. In general the country round about the river-banks is flat, and densely covered with a fair-sized growth of valuable timber down to the water's edge. Palo santo of a somewhat stunted growth is found. Cliffs are unknown in this extension until about 12 miles off Paso Rivadavia, where for a short distance they are found on both sides, being about 12 feet high, and covered with detached trees and fine grass. The course of the river seems to change somewhat, the stream itself cutting more direct channels through the soft soil, especially at this season, when the river is apt to overflow its banks. Although very fertile and healthy, this district is very scantily populated by white people, probably from its distance from any marketable centre and present mode of communication therewith. Several ranches or habitations are seen on the banks of the river; notable amongst them is that of Señor Tomas Ruiz at Puerto Belgrano (on the opposite side of the river), and distant about 3 miles from the old abandoned fort of the same name. Here the Mataco Indian has his home and happy hunting-grounds, but seems to live at peace with the white settler, who has invaded his domains without compensating him in any way for his loss, so it is not to be wondered at if animals are occasionally stolen.

Belle Ville—lat. 24° 21′ 10″ S, long. 61° 43′ 50″ W. of Greenwich—is the place where the last settlers (families) are, their dwellings being on the higher land at some little distance from the river, and right amongst the domains of the most powerful cacique (Indian chief) of this district, Sumaye. Soon after passing the Paso Rivadavia (which had 5 feet in it on April 2 over a hard bottom) to the confluence of the Teuco and Bermejo Central—lat. 25° 37′ 20″ S., long. 60° 14′ 50″ W. of Greenwich—this river changes considerably as it winds its crooked course, still in a more or less south-easterly direction, through a very flat, marshy district, where timber is scarce and of very poor quality. Its banks are scarcely a foot above the water, and covered mostly with kind of common pampa grass, and inhabited by the jaguar and mosquitos. The bed of the river is uneven, forming many rapids (saltos) and the Paso Roca (named after the actual president), where it crosses the 25th parallel of latitude. Here on April 3 only 3 feet of water was found over a hard bottom. Probably, on the other side of the island (isla del Carpincho) more water is to be found. A little further down, after passing between two cliffs 12 feet and the last rapid, Angostura (60 yards broad) is reached—the narrowest part of the river—and the coasts begin to be higher with a better class of vegetation, and timber of some value, though sparse, is seen. Palo mataco (*Acholocarpus præcox*) is found in small quantities after passing

the 60½ parallel of longitude at Monte Sindo, so called as being the first timber of any size seen since leaving Paso Rivadavia. Again now the river seems to have a more uniform depth, as the surface was not disturbed nor bottom found at 12 feet. Toba Indians are the undisputed owners of this district, under their cacique Pedro, and the only time (on April 6) they were spoken with seemed to be friendly, asking for tobacco and wearing-apparel. This low marshy district between Paso Rivadavia and Paso Roca has the appearance of being once thickly timbered, as many dead trees, principally the Sempiternal quebradio colorado, are still visible, with their roots some 6 to 8 feet below the surface. Probably when all, or at least most, of the water of the upper Bermejo found its way down the Central Bermejo, this district was a large canada, and the Teuco unknown below Belle Ville, where it was a mere backwater, receiving some water from the Bermejo when flooded. Then a season has brought a greater amount of water than usual, which has cut its way through the bluffs, filling up the cañada and forming an immense lake, killing all the trees, and eventually, year after year, depositing its thickly impregnated water, until it has silted up to its present level, some 6 to 8 feet. Then, through another unusually big flood, the barrier at the south-eastern extremity (the cliffs just below Paso Roca) was broken through, and thus formed the present river Teuco. It is a well-known fact that these regions, as well as the rivers Paraguay and Parana, are periodically visited (about every ten years) by big floods.

Lower Bermejo.

April 7.—Light north-east wind, and cloudy. Left camp at 6 a.m., all day proceeding without anything occurring worthy of note. The shores seem to be higher, and covered with a thicker growth of vegetation. At 3.30 p.m. heavy squall from north-east with rain, so camped for night in a thick forest on right bank of river.

April 8.—Moderate north-east wind, and cloudy. Left camp at 6.30 a.m. The coasts here are about 10 feet high in places, and covered by thick grass and detached forest. At 9.45 a.m. we passed the site of the abandoned Fort Wilde. At 1.30 p.m. arrived at the first or outpost of civilization—Fort Regimiento 12 de Caballeria, situated on the left bank of the river, on top of a cliff 15 feet high. At 5 p.m. arrived at Fort Presidencia Roca, situated on right bank of river, in a bend, on the top of a cliff 15 feet high, where camp was formed for the night.

April 9.—Light north wind, and fine clear weather. Left camp at 6.30 a.m., arriving at 8.30 a.m. at the Arrayo Acacia, where a stop was made for the day to wash clothes and the boats in the clear water of this arrayo. At 4 p.m. moved about half a mile further on, where camp was made for the night.

April 10.—Moderate north-east wind, and fine morning. Left camp

at 6.15 a.m., proceeding until 8 a.m., when the site of the abandoned colony Azara was passed. At 3.30 camped on left bank of river, it having commenced to rain heavily, with thunder and lightning, which lasted all night.

April 11.—Light north wind, with overcast sky and drizzling rain. Left camp at 8 a.m., soon afterwards passing a rapid (supposed to be Salto de Izo). At 11 a.m. arrived at the Comisaria de Formosa, where a stop was made for breakfast. At 3 p.m. arrived at the once prosperous, but now deserted Pueblo del Expedicion, where camp was formed for the night, the weather threatening rain.

April 12.—Light north-east wind, and dull cloudy morning, with rain up to 7.30 a.m. Left camp at 8 a.m., half an hour later passed the island Na Curutú, and at 3.45 p.m. the almost deserted colony of Grandolfi. Stopped for the night at 4.20 p.m.; a good camping-ground was difficult to find, as the coasts are low and marshy, in many places covered with water from the recent heavy rains. It began to rain soon after getting camped, and continued all night.

April 13.—At noon it began to clear up, with fresh south wind. Left camp at 12.30 p.m., passing through a zone of palm trees. At 2.14 p.m. we passed the telegraph wire which connects Formosa with Resistencia, camping at 4 p.m. for the night on the edge of the palms.

April 14.—Moderate north-east wind, and cloudy. At 6.20 a.m. the *Ledesma* left with chief of expedition on board, to go on ahead as far as Corrientes, leaving other boats to follow on in a day or two, when crews were rested.

April 15.—Light easterly wind, fine and clear. Some of the members shot, fished, etc. At 5 p.m. began to cloud over and rain.

April 16.—Fresh south wind, and cloudy; rained in showers all night. Left camp at 6 a.m., reaching mouth of Bermejo at 9.30 a.m., and Puerto Bermejo, or Timbo, at 2 p.m., when camp was made for the night.

April 17.—Moderate south wind, and cloudy. At 5.30 a.m. left camp at Puerto Bermejo, passing Humaita at 7.30 a.m., Las Palmas at 9 a.m., and the Boca del Paraguay at noon. Arrived at the city of Corrientes at 4 p.m., where the *Ledesma* had arrived at 8 a.m. The Lower Bermejo is perhaps better known than the Teuco, or upper Bermejo, on account of its proximity to a grand fluvial highway. The general course of this river is in a south-easterly direction, although very crooked, winding about in a most extraordinary manner, and flowing at the rate of from 3 to 5 miles an hour, over an uneven bottom of sand, and in places tosca (a soft sandstone). In some of the reaches snags are very common, making navigation extremely dangerous. Some twenty years ago several small steamers were sunk by running on these, while attempting to reach the province of Salta, by the river Paraguay, by this waterway. In those days the Teuco was a small stream of no importance, and the Central

Bermejo, with its flourishing colony Rivadavia, was thought to be the only practicable highway. But twenty years has seen changes, not only in a river, but also in shipbuilding; great and important strides have been made in the construction of shallow-drafted steamers, so that to-day this river, minus some of the numerous snags, and perhaps with a little dredging, could be made into a great commercial highway, and through this channel, probably, the riches of Bolivia will in the near future find their way to the over-sea markets. The shores and cliffs rise gradually until the locality of Presidencia Roca, when the latter are some 12 to 18 feet above the water, and continues, more or less, till Pueblo de la Expedicion is passed, when they begin to descend. Low coasts are found from below the Gandolfi colony to the mouth of the river, opposite the Isla Monterita in the Paraguay river. These shores are covered in all their extent with detached forest, intercepted by open ground, and in the low marshy regions covered with pampa grass, Caña de Castilla, and the higher regions with fine grasses. They are very thinly populated. At the last outpost, Fort 12 de Caballeria, there is a sergeant with six soldiers; also a small shop (almacen) kept by an enterprising individual, who trades with the Indians, exchanging bad liquor, tobacco, and clothes for skins of wild animals, bees-wax, feathers, and the like. At Fort Presidencia Roca a sergeant with eight soldiers, with some of their wives, were the only inhabitants. About 12 miles lower down is the site of the now completely abandoned colony Azara, with all its habitations in ruins, and its once valuable machinery about the long grass of this park-land region. Further down Colonel Uriburn has a fine cattle-ranch (Estancia). This, and the other, at the once flourishing, but now almost deserted camp-town of Pueblo de la Expedicion, with its single remaining house, are about the only places left of any note. Cultivation of any kind seems not to be practised at present, although anything of a semi-tropical character will grow—sugar-cane, castor-oil plant, tobacco, and the like all grow well, besides maize and vegetables. In several places piles of cut timber, palms, and charcoal were seen on the bank in an abandoned condition, having lain there some time, and half grown over by vegetation. All this goes to show the richness of this region, and how easily it could be populated and formed into a thriving district if only regular traffic was established, by which means a market could be reached at moderate cost. Toba Indians inhabit this region, but were not seen, keeping out of sight probably from their fear of the white people.

NOTES ON THE COUNTRY BETWEEN LAKE CHIUTA AND THE RIVER LULI, CENTRAL AFRICA.*

By Captain F. B. PEARCE.

THE Anglo-Portuguese military expedition (1899) against the slave-raiding chief Kwamba enabled me to traverse the hitherto blank piece of country between Lake Chiuta and the Luli river. I have, at the end of this article, noted the methods by which the accompanying map was compiled; so, leaving this part of the subject, I will note the character and features of the country through which I passed, commencing at Madziabango, situated at the north-eastern corner of Lake Chilwa.

Madziabango is not the name of a village, but of fresh-water holes. These shallow wells are situated on the wooded ridge which separates the respective levels of Lakes Chiuta and Chilwa. This ridge is about 30 feet above the flat level plain, which may be taken to represent Lake Chilwa; I say represent, for during the dry season (April—December) no signs of open water can be seen when looking south—only a dead level grass plain to the very horizon. The water, after deepening the existing holes, was good, and indeed all similar water-holes can be made to yield a fair supply of water by a little judicious digging and deepening. A good view of Chikala mountain, and beyond that Zomba mountain, can be obtained from Madziabango, while to the east the Luasi hills can be seen. The usual game, consisting of hartebeest, reed-buck, pig, and kwapi, can be found round Madziabango.

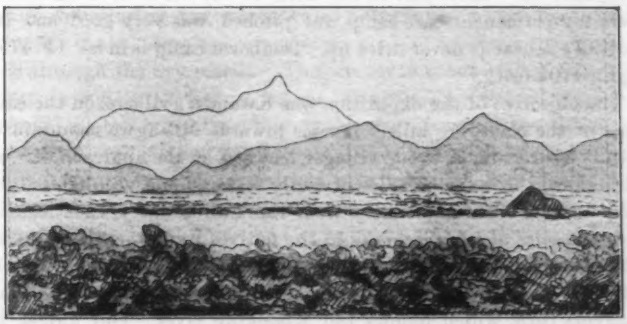
Leaving Madziabango, the path, which is level all the way, runs due east for a mile, when the No. 9 boundary pillar is arrived at. This post has been erected by the Anglo-Portuguese Provisional Boundary Delineation Expedition, and has been taking by them to mark the north-eastern corner of Lake Chilwa—lat. 14° 57′ 40″. The path then trends north-east and north, and runs through the usual scenery of small forest trees, with occasional open grass plains. One mile beyond the boundary pillar water-holes are arrived at. At 7 miles from Madziabango the Pamtundu water-holes are reached, and from an anthill close to the wells the first view of the southern open plain of Lake Chiuta can be seen. This plain resembles the northern plain of Lake Chilwa. It is quite flat and covered with short grass, and extends in an unbroken level as far as the eye can see. On this plain buffalo, gnu, hartebeest, and various smaller antelopes are to be found.

From the Pamtundu water-holes northwards the open plain is kept in view on the left until Tombowe hill is reached. Here there are villages with large mopeira (millet) and cassava fields. Tombowe hill is about 100 feet in height, and from its summit an excellent view of the surrounding country can be obtained. To the north the eye extends

* Map, p. 680.

across wooded undulating land, rising at intervals into small rounded hillocks. Lipembegwe mountain can be seen, and beyond that again the top of a large mountain, which must be situated near the Lujenda river. To the west the ground slopes gradually down to Lake Chiuta, and open water is seen opposite Mundi hill. The Mlinde hills rise about 6 miles from the lake's west shore, and beyond those hills Unango peak is remarkable as a fine bold summit.

Owing to wars and rumours of wars, the country to the east of Lake Chiuta is not now thickly populated, and most of the villages have been moved into British territory on the western shores, where there are now many villages. The portion of Lake Chiuta not covered with reeds is a pleasant piece of water, with clean level banks; it is shallow, the average depth appearing to be from 3 to 9 feet. The shores are covered with various fresh-water molluscs, whilst its waters are inhabited by



VIEW FROM TOMBOWE HILL, LOOKING WEST.

hippopotami. Since a channel has been cut through the thick reeds between Chiuta and Amaramba, I hear that crocodiles are finding their way into Chiuta. In Amaramba and the Lujenda outlet these reptiles are exceedingly numerous. One curious feature of the lake, which doubtless has been mentioned before, is the piles in the water, which still remain to mark the existence of lake dwellings. They are clustered towards the east side, and are generally situated about 50 to 200 yards from the shore. The water is now about 6 to 8 feet deep around them. These water-dwellings were, of course, a means of safety against raids and warfare, and besides being used as temporary dwellings, the year's food supplies were placed in this African Venice for safety. I think we can deduce from these piles that the rise and fall in the lake is very slight, for during the dry season (August) the forked tops of the piles on which the floors had rested were only generally about a foot from the water-surface. The large extent of reeds which separates Chiuta from Amaramba was this year (1899) traversed by a canal, cut at the instance

of Mr. Alfred Sharpe, so that passage by water can now be had between the two lakes.

To return to Tombowe hill. Towards the south and south-west on a clear day Zomba and Chikala mountains can be distinctly seen, and Chilwa island. Between Tombowe and Chikala stretches the great Chiuta plain already mentioned, its monotony only broken by Nafisi hill on the opposite shore, but so low is this shore that the level appears to extend almost indefinitely. To the south the Luasi hills are visible, and towards the east very typical country is seen—dense forest land of small trees, broken here and there by the yellow grass of the open "dambos" (plains). The ground appears level to the horizon, but in reality it consists of enormous but gradual undulations, the ridges and furrows of which run north and south. Nearly due east on a clear day can be seen the mountain called Mtungwe, of which I shall have to speak more in detail later on. The water in the holes to the north of Tombowe hill, where my permanent base camp was pitched, was very good and fairly plentiful; I hear it never dries up. Tombowe camp is in lat. 14° 47′ 35″; height, 1707 feet.

The objective of the expedition was Kwamba's village, on the eastern slopes of the Namwero hills. Guides towards Mtungwe mountain were difficult to procure, as every villager had fled on the approach of "war," and besides, the 40 or 50 miles of badly watered and uninhabited forest which separates Chiuta country from the Luli country, constitutes the latter a species of *terra incognita* to the natives living near Lakes Chiuta and Amaramba. The most direct way, I believe now, would have been along the road to Mtumbi hills, and thence to the main Kwamba-Mkanyela path, which follows the Mtamkulu river. Our guides, however, led us towards the Mkloma hillocks, which lie due north of Tombowe, and then cut off to the east towards Mtungwe.

At first the path leads through open country scattered with stunted forest clumps. After leaving Mkloma hills, however, and with our backs to the lake, the country changes somewhat, and the open plains (dambos), which form such a marked feature of the country round the lakes, become smaller and smaller and fewer in number until they may almost be said not to exist. The whole country is thickly covered with trees. The trees vary from 18 inches to 3 feet in diameter, and, except on the banks of streams, larger specimens are rarely met with. The highest varies from 10 to about 35 feet. There is little or no undergrowth except near the bed of streams. In this part of Africa this is known as forest, and theoretically the nomenclature is doubtless correct, but such forest must not be confused with such forests as are met, for instance, on the West Coast. These latter forests consist of masses of gigantic trees for the most part growing out of tangled masses of creepers and dense thicket-growth. The forests in this part of Africa, although equal in the extent of ground covered, consist of quite small trees with little

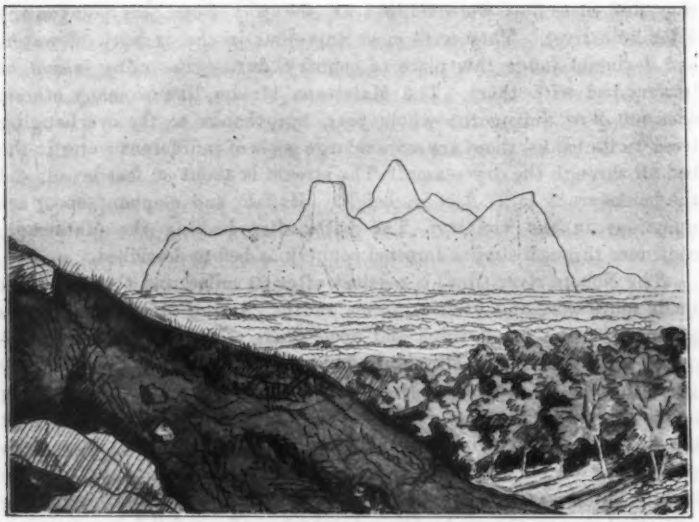
undergrowth. Every few miles open plains are met with. These plains may be 200 yards in breadth, or may extend to as much as 2 or 3 miles; on these plains game is generally found.

After leaving Mkloma hills, the next rise is the north hill of Nangulukutuchi. These three hills form or stand on the watershed between Lake Chiuta and the Luli river, but this watershed is very indefinitely defined. After leaving Nangulukutuchi hill the road runs through the usual forest of small trees, with an occasional bamboo brake. At 5½ miles from Nangulukutuchi the path perceptibly tends downwards, and after a fairly long but gradual descent the Matawapa river is reached. After leaving Nangulukutuchi hill tsetse fly was observed for the first time, and these flies were noticed all the way from this point to the Mtamkulu river. They were most numerous in the vicinity of water, and I should judge this piece of country, during the rainy season, to be very bad with them. The Matawapa stream, like so many others, does not flow during the whole year, but, thanks to the overhanging trees on its banks, there are several large pools of indifferent water in the bed all through the dry season. The stream is about 30 feet broad, and the banks are 8 to 12 feet in height. Buffalo and elephant spoor are numerous in the vicinity. The path, after leaving the Matawapa, continues through similar forested country as before described.

The Nchere river (dry) is reached after 5¾ miles, and then the path tends south-east, and even at times south. As the Mtamkulu river is approached, the forest thins and open grass patches become more frequent and larger. The Mtamkulu river is, at the point of crossing, 60 yards in breadth, with an uneven rocky bed, which makes the crossing in the rainy season a very dangerous and difficult matter. In August the water was not flowing, but there was ample water in very large deep pools; the water was not clear nor very good. The banks vary in height, but were only a few feet high at the place of crossing. Crossing was effected over the rocky (limestone) edge of a "fall" between two large water-pools, the one towards the east being about 10 feet lower than the one on our right. The path passes through a scattered village (the first sign of habitation since leaving Tombowe hill) immediately after quitting the Mtamkulu, and proceeds towards the centre of the Mamwero hills. The hills, as will be seen on reference to the map, are 10 miles in length, and they attain a height of about 800 feet above the surrounding terrain. They are covered with small trees and bamboo thickets, while the summits are generally bare rock.

Four miles after leaving the Mtamkulu river the path bifurcates, that going to the right leads direct to Kwamba's villages, and that tending north-east or to the left passes between the northern slopes and Mtungwe mountain, and eventually leads to the same locality as the path on the right. For various reasons we took the north-east or left path, and this led us through a few small villages with the usual fields of

cassava and mopeira. During this time we had the great mountain of Mtungwe straight ahead. A certain amount of verdure grows on the lower slopes, but the extreme precipitousness of its sides prevents growth to any height. There are two distinct features in this fine mass of rocks. They are (1) the cone summit on the eastern scarp, and (2) the round hump, or bluff, which tops the western precipices. The cone is the higher of the two, but both are wonderful specimens of great rock masses. Both cone and bluff are absolutely devoid of vegetation, and, indeed, for 2000 feet below their summit there can scarcely be said to be a sign of it. The Mtamkulu river flows close along the



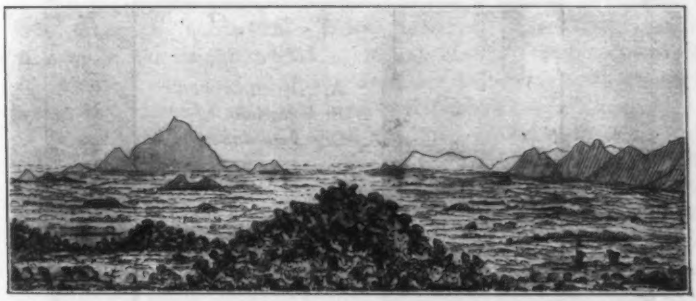
VIEW OF MTUNGWE MOUNTAIN.
(*Sketched from near the Matawapa river.*)

southern face, and all around the neighbourhood of the river is thickly forested.

Several miles away from Mtungwe, we noticed what at first every one took to be water flowing from the south-western face of the precipice. What we saw were two very long brilliantly white stripes on the mountain face. The stripes, or streaks, were perhaps fifty yards apart and parallel, and I may not be far wrong if I judge the width of each to have been 20 to 30 feet. They appear to start suddenly from about 1000 feet above the foot of the mountain, and to descend perpendicularly until lost in the trees beneath. Even through glasses it was at first difficult to believe these enormous white stripes were not

water, as they were so parallel throughout their course to each other, and appeared to fall so true. On approaching them closer, however, I think we all became convinced that these stripes were not water, but were evidently parallel seams of intensely white quartz (?) or limestone (?). (I fear my geological knowledge will not admit of my being more definite than this as to the formation.)

The path, as I have already mentioned, passes between the Namwero hills on the south and Mtungwe on the north. The distance between the two is generally about 3 to 4 miles, and the length of the pass thus formed is about 4 miles. Halfway through the pass the south-east precipices come into view. This is by far the grandest side of the mountain, and, indeed, I have never seen anything to equal the enormous face of smooth, bare perpendicular rock which forms the side. To the very summit there is not even an appearance of growth, and the sheer wall must be, I judged, over 3000 feet in height. The bareness and

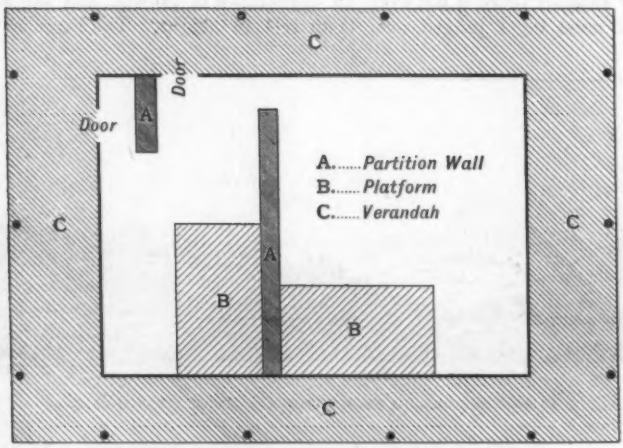


VALLEY OF THE LULI FROM KWAMBA'S, LOOKING NORTH-EAST.

smoothness of this south-east face is evidently due to the fact that from this direction the south-east monsoon blows, and the wind and rain has, to all intents, planed smooth the great face of the mountain.

The impression of the Luli valley, when first seen, is that of a great forest-covered plain, shut in on the south by ranges of hills, but open to the east and north. The bold peak of Maripa, however, breaks the continuity of the horizon towards the north-east. No villages nor signs of human habitation are met with in or around Mtungwe; it is not until Kwamba's village is reached that any signs of life are seen. The villages in this part of Africa (except those of the Angoni) are scattered and indefinite collections of huts, and Kwamba's is no exception to the rule. The village, or, to be exact, the series of villages, extend for many miles along the slopes of the Namwero hills. Extensive fields of mopeira, cassava, tobacco, and a little sugar-cane surround the villages. Kwamba's houses are situated at the northern end of these

series of villages, and the immediate valley in which his buildings are placed is almost entirely shut in by the Namwero hills on the north and west, and by small detached hills in the other directions. Some of the houses are circular, but these more generally appeared to be used as granaries. The natives store their grain in a neat and clean manner. The grain was stacked on a raised platform 4 feet in height. The interior of the granary, including the floor, is plastered with dark blue clay, and the whole is kept most scrupulously swept and cleaned. The dwelling-houses are generally rectangular, surrounded by verandahs. The interior of these houses is somewhat curious; it is divided off by two partition walls, which are 3 to 4 feet in height, and do not, therefore, extend to the ceiling or roof. One partition wall is built right across the house, with the exception of just room enough to squeeze



PLAN OF AN ALOLO HOUSE IN KWAMBA'S VILLAGE.

The partition walls are 3 to 4 feet in height and 1 foot thick.
The platforms are 6 to 8 inches high.
The earthen floor of the interior is on same level as outside ground. The verandah, however, is 12 inches above this level.
The doors are of board, and are removable.
The object of the smaller partition wall is not quite apparent, unless its use is to exclude the draught.

through at one end. The result of the partition wall is that the house is divided into two recesses or rooms. In each recess is a small platform about 6 to 8 inches high, which is evidently used as a bedstead and seat. The tops of the partition walls serve as tables. Over the door is a hole just under the eaves; this is for ventilation and for allowing the smoke of the fire to escape. The roof, of course, is thatched, and the verandah is raised about a foot above the natural level of the soil. There were no signs of goats or cattle, but each house had its fowl-house, which was generally formed out of a trunk of a tree

hollowed out and laid on a pile of rocks and stones. One end was closed, and the log is kept from rolling away by rocks being piled upon it.

A good view of the Luli valley is obtained from the small hill exactly opposite Kwamba's houses. The range of hills to the east and south-east is higher than the Namwero hills, and there are some rather fine cliffs opposite Kwamba's. Our guide called this range the Makua hills, but this probably is the general name for all the country from Kwamba's to the coast. The Makua hills (for want of a better name) rise from 1000 to 1200 feet. The north-east and south-west limits of this range are accurately laid down on the map. The ranges lying beyond the Makua hills to the east are similar in appearance, and I judge them to attain a similar altitude (1000 feet). As far as the eye can see, the whole country is thickly forested, and there are no signs of clearings which might indicate fields or sites of villages. There are no villages between Kwamba's and the Luli river, but I noticed several fires on the slopes of the Makua hills, which would appear to indicate human habitation. I was informed that there were no villages in the neighbourhood of mount Maripa. The water-supply at Kwamba's was obtained from water-holes and a very small stream of water which issued from a rock close to Kwamba's house.

It was with regret that I found my duties prevented me from staying any length of time in the country and exploring thoroughly the surroundings. Our return route passed over the Namwero hills to the south. Except in two parts, the gradient was fairly easy, and, as already mentioned, the path from Kwamba's cuts into the path we had traversed a few miles to the east of the Mtamkulu river, and thus we regained the route by which we had approached the Namwero hills. The expedition returned to Lake Chiuta by the same path as that it had come by.

Notes on the Map.—This has been made by means of prismatic compass observations and by observations for latitude, the whole forming a system of triangulation. No attempt was made to obtain observations of longitude, the longitude on the map being based upon the position of Madziabango shown by O'Neill in his 'Preliminary Map of a Journey to Lake Kilwa.' For the observations north of the open water of Lake Chiuta, I am indebted to Mr. A. Sharpe's kindness. His observations were made during the early part of 1899, and the latitude of various points on Lake Amaramba fixed and many bearings by prismatic compass taken. The heights noted were obtained by average readings of two "boiling-point" thermometers. The height of Mtungwe mount has not been calculated, but my estimate of 9000 feet will not, I feel sure, be far wrong, as in a great many features this mountain was similar to the Mlanje mountain in the Protectorate territory. No base was actually measured, but the scale was obtained by reducing the difference of latitude between two places to statute miles, and as the various details shown on the map were obtained by triangulation, the respective distances are, of course, proportional to the distances between parallels of two points fixed by latitude. There is thus a difference of latitude of 10° (nearly) between

Madziabango and Tombowe water-holes. Between the parallels passing through these two points there is a difference, therefore, of 11·51 statute miles. On the same scale of latitude Mr. Sharpe's observations on Amaramba have been laid off. The difference between parallels of Tombowe water-holes and the point which marked our camp on the Matawpa river has also been used as a check, and, as will be seen, has worked out accurately. The position of intermediate points other than points of triangulation has been fixed by "time and marching" observations, and as the routes were traversed generally more than once, I am of opinion that very fair accuracy has been attained as regards these minor places. It is a good country for triangulation purposes, and had I had an opportunity for more extensive observations, the extent of ground which could have been mapped would have been very much increased.

A JOURNEY THROUGH SOUTH-WEST SECHUAN.

By EDWARD AMUNDSEN.

I STARTED on December 13, 1898, from Ta-chien-lu, my aim being to cross the unknown part of Chalag and Mili. These two districts, though within the jurisdiction of the province of Sechuan, are by the Tibetans called "kingdoms," and each has its ruler or Tibetan king. The Chinese officials at Ta-chien-lu tried to dissuade me from attempting the journey by representing the dangers of the road, and the character of the people; but, finding I was determined to go, they eventually procured passports for me in both Chinese and Tibetan, and furnished an escort of two men, one of each nationality, to protect and help me on the way. Two servants, one a Lhasa man—Yin Chung—kindly lent me by Mr. C. H. Polhill-Turner, completed the party.

Our first eleven days' march lay through the country of the "King" of Chalag, who resides at Ta-chien-lu. The much-scattered population of this district speak the official language of Kham to a certain extent, but in the family circle the dialect of the respective valleys is used, and each valley seemed to have its own dialect. Of the people and customs I need not speak much, my main intention being to give a few notes of the geographical features of the country traversed, but I may mention the fact that everywhere I received the greatest kindness from the simple hospitable people.

The "king" having sent word through his officials to the people along the road, my coming was everywhere expected, and unpleasantness was avoided. The country is a succession of mountain ranges. We crossed no less than thirteen passes from Ta-chien-lu to Ba-u-rong. Luxuriant pine forests abound everywhere except on the crest of the passes, where small shrubs only were to be seen. The forests increased in grandeur as we went farther south, till in the valley before reaching Ba-u-rong I imagined myself among the mountains of Norway. The land, when not used for pastoral purposes, is given up to the cultivation of barley, wheat, Indian corn, and buckwheat. After climbing the last

pass, Ko-se-la, an almost perpendicular descent brought us to the village of Ba-u-rong, a place with about eighty families, Chinese and Tibetans, a cosy spot on the left bank of the Nak-chu river. The valley is warm and fertile, yielding three crops a year. Here we remained over Christmas, waiting for the people of Mili, the next "kingdom," to come and receive their charge. The two runners from Ta-chien-lu, having escorted me thus to the boundary river between Chalag and Mili, were now at liberty to return, having only to see us across the river and on to Milian soil.

A messenger had been sent on to the Mili chief with an order for "oola" (*i.e.* baggage animals) and escort to the palace of the Mili king. The manner of sending such an order is unique. My whip was tied on to a piece of wood, to which some feathers were also attached; this was sealed with the chief's seal, and couriers ran with all despatch carrying this queer official document to its destination. The Mili chief happened to be away from home, so the messenger had to go to a more distant point. Meanwhile the Mili people, in fear and trembling, received me, and, on the security of a Tibetan runner, gave me "oola" for the further journey.

On Monday, December 26, we were escorted by about thirty people to the bank of the Nak-chu, and ferried over on a raft made of two pieces of timber, with a plank in the middle to stand upon. The horses had to swim across. During the high water in summer the raft cannot be used, and recourse is had to a bamboo rope stretched from bank to bank—a rather risky business, I imagine, as the river is probably 60 yards broad, and the rope bridge very high. We found the heat on the river-bank oppressive as compared with the atmosphere of the mountains we had been crossing. Having crossed the Nak-chu in safety, we climbed to the first Mili village, about 1000 feet above the river. The road on this side of the river is nothing but a poor footpath along cliffs and steep mountain ranges. A day's journey will often take the traveller no farther than he can call back to his last night's resting-place, traversing the deep valley between having occupied all his time from daybreak.

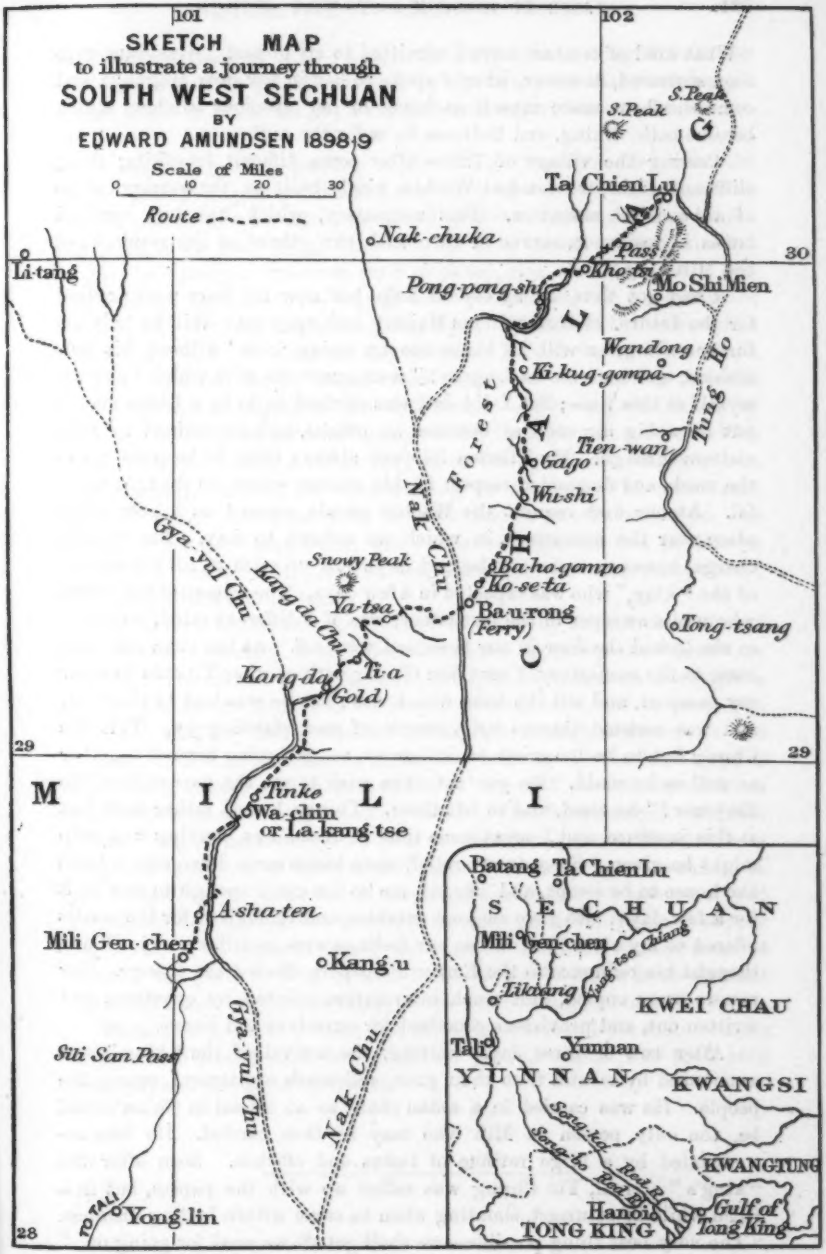
The Milians are poor, and have the appearance of an oppressed people. Their houses are small and dirty, with simply no furniture in them, save a stool or two to put the food on while eating, though in some of the better ones they are able to offer the traveller a cushion or piece of skin to spread on the floor for a seat. The one room, which has neither windows nor chimney, serves for bedroom, dining-room, parlour, guest hall, and kitchen. The family and guests, besides, perhaps, a goat or two and a pig, all find accommodation in this one room.

However, I did not hear much complaining on the part of the people; even the poorest with only Nature's covering on seemed to be content, and ate their buckwheat cakes with gratitude to the lama-deity for

life and safety. These cakes are a staple diet among the Tibetans here, being easily made with just water and buckwheat, and cooked on a fragment of some discarded iron pot. I found them to be superior as an article of diet, and a welcome change from "tsamba" (barley meal). The Milians cling to Tibetan customs and fashions as far as they are able. They dress in orthodox Tibetan fashion when possible — the lamas, of course, always do so—but many of the people cover themselves with whatever they can get, adding, whenever they go out on a journey, the large heavy cloak of the Lolos, which is both clothes and tent in emergency. The people are peaceable and law-abiding, and always speak highly of their lama-king, or, as they sometimes call him, "the incarnate lama," who owns allegiance to the Dalai-lama at Lhasa, to whom he must pay an official visit before being recognized as the "king" of Mili. Tribute is also paid to China every twelfth year. In religion they adhere to the "Yellow Sect," or reformed church of Tibet.

To the Nak-chu I followed the road traversed by M. C. E. Bonin two years ago, but from that point to Mili Gen-chen (the principal place in Mili), so far as I am aware, no foreigner had ever travelled the road I took. On December 30 we reached the Gya-yul-chu, or "river of China," as the Tibetans call it. It flows, I was told, down from Litang, and is not more than half the size of the Nak-chu, and is very shallow in parts. Before reaching the Gya-yul-chu we passed along the Kang-da valley, through which falls the Kang-da-chu, emptying itself into the river just mentioned. This valley has made Mili famous for its gold, which is found in the river-bed. In past years this had proved a great attraction to the Chinese, who came as goldseekers, but it proved also their ruin. The Milians combined and killed off the immigrant Chinese by rolling rocks and trees upon them from the mountain-sides, and thus rid themselves of their undesirable neighbours. Now none but Milians wash for gold.

From the village of Kang-da, a thriving place, four women were sent to carry my things and escort me to the next place, and they did it singing as they went. One sang the solo part, and the rest took up the chorus, while now and again one of the more pious broke the melody by turning to prayer, a combination that greatly helped one to forget the rough and difficult road. On this stage darkness overtook us when we reached the place where the road bends to the south, following down the Gya-yul-chu, which we heard rather than saw on our right. The women carried pine torches to show the way through the forest, and we reached a solitary roadside house about 9 p.m. The woman of the house made great objections to us staying, but, as she knew the women carriers, she at length consented to our doing so. Once inside the house her feminine curiosity overcame all other feelings, and she came holding up the torch close to my face to inspect the new arrival. So astonished was she that she smote upon her breast, saying, "Holy Trinity!" as much as to say,


101
102
SKETCH MAP
to illustrate a journey through
SOUTH WEST SECHUAN
BY
EDWARD AMUNDSEN 1898-9
Scale of Miles
0 10 20 30
Route
S. Peak
S. Peak
Ta Chien Lu
Nak-chuka
Pass
30
Li-tang
Pong-pong-shi
Kho-ta
Mo Shi Mien
Wandong
Ki-kug-gompa
Tung Ho
Tien-wan
Gago
Wu-shi
Forest
Nak Chu
Gya-yui Chu
Kang-da Chu
Snowy Peak
Ba-ho-gompo
Ko-se-ta
Ya-tsa
Ba-u-rong
(Ferry)
Tong-tsang
Kang-da
Tiva
(Gold)
29
29
M I L I
Tinke
Wa-chin
or La-kang-tse
A-sha-ten
Mili Gen-chen
Kang-u
Siti San Pass
Gya-yui Chu
Nak Chu
TALI
Yong-lin
28
Batang
Ta Chien Lu
S E C H U A N
Mili Gen-chen
Litang
KWEI CHAU
Tali
Yunnan
YUNNAN
KWANGSI
Song-ka
Song-ka Red R.
KWANGTUNG
Hanoi
Gulf of Tong King
TONG KING

"What kind of creature have I admitted to my house?" Her fears were soon scattered, however, when I spoke to her in her own language, and commenced to make myself at home in her spacious kitchen, which became bath, dining, and bedroom to us for the night.

Passing the village of Tinke after some difficult travelling along cliffs and rocks, we reached Wachin, nicely built on the southern slope of a beautiful mountain. This monastery, which has two hundred lamas in residence, serves in turn with two others as the residence of the Mili king.

I had got thus far by official help, but now my fears were aroused for the future. "How will his Majesty look upon me? Will he help me further along, or will he blame me for using 'oola' without his permission, and send me back again?" were questions with which I puzzled myself at this time; but I did as I was advised to do by a Lhasa man—put on a big air such as becomes an official, and determined to push matters through. My Tibetan follower always tried to keep me up to the mark, and demanded respect for his master where he thought needful. At our first request the Wachin people showed us a poor dirty place near the monastery, in which we refused to stay. The lama in charge, however, came and begged us to put up with it till the arrival of the "king," who was expected in a few days. The woman of the house, who was a sweeper in the monastery, was of a different mind, however, so she locked the door in our faces and went off. As the lama had gone back to the monastery, I sent Yin Chung with another Tibetan to show my passport, and tell the lama who I was; but he was told to clear out, and was assisted thereto by a couple of men standing by. This Yin Chung felt to be too great an indignity, so, gathering himself together as well as he could, "Do you not even wish to see the papers from the Emperor?" he cried, and so left them. Things looked rather dark just at this juncture, and I spent some time in uneasiness, praying that help might be given. Soon, to my relief, some lamas came down and ordered the house to be swept, and begged me to be good enough to stay in it for a few days; also gave me some eatables, and apologized for the insults offered to my attendant, and so our feelings were mollified. Yin Chung thought his reference to the Emperor's papers effected the change. Our papers were copied, and much information elicited by questions and written out, and provisions promised for ourselves and horses.

After two or three days' waiting, the arrival of the "king" was announced by salutes from their guns, and much excitement among the people. He was carried in a sedan chair, as an official in China would be, the only person in Mili who may be thus carried. He was accompanied by a large retinue of lamas and officials. Soon after the "king's" arrival, Yin Chung was called up with the papers, but in a little while he returned, shouting when he came within hailing distance, "The very best thing possible—we shall get all we need for going on;"

for which we thanked God. Again the lama came, calling Yin Chung with papers; but he quickly came down again, saying that the "king" wished to see us all, so we got some presents ready and set out for the monastery.

In the big gateway leading to the "king's" residence we were met by the kutsab (or prime minister), who took us upstairs and seated us till the passports were again examined, presents exchanged, and so on. We failed to see the "king," however, for some reason not stated; but he gave us numerous presents, such as sheep, rice, tea, butter, salt, and whatever we needed in the way of food, promised us all we needed to continue our journey, only asking that we should stop at the monasteries on the way, and not with the lay people. Indeed we received much kindness at their hands. Next morning we got on the way for Mili Gen-chen—the metropolis of the Mili district—following still down by the Gia-yul-chu, road good and almost level, through a fine valley which I called Edward's dale, a warm cosy place with good camping-grounds. I spent a night here in the open waiting for "oola." The escort sent by the "king" acted as cook, and we had a royal feast from the "king's" bounty. The escort was a famous cook, and told us that he served the "king" for his food only, the service being compulsory, reckoning as the family tax.

The second day on this road we were joined by all the small lamas and officials returning to Mili Gen-chen, after escorting the "king" to Wachin. The kutsab and chan-tso, principal officials, were most polite to us. The second night out we stayed at A-sha-ten, and entered Mili Gen-chen next day before dinner. This place, though so famous in the kingdom of Mili, is really a big monastery built on the southern slope of a mountain range, with a fine forest of oak and pine in it, with an equable climate and not excessively cold. It is the principal residence of the "king;" he lives here a year or two, then goes to Wachin for a time, and thence on to Kang-u, and again returns to the Gen-chen. A nice bungalow was furnished us outside the monastery, where we stayed a couple of days and proved the truth of the "king's" promise to supply our needs. The officials visited me, wanted to see my things, some of which I had perforce to give them. Altogether we had a most pleasant time, and carried away good impressions of the kingdom of Mili.

From this point we crossed into Northern Yunnan by a route of some considerable length, and were then on ground which has been both travelled and described by others.

PROF. WAGNER'S TEXT-BOOK OF GEOGRAPHY.

By HUGH ROBERT MILL, D.Sc., LL.D.

ALTHOUGH Prof. Wagner's 'Lehrbuch der Geographie'* appears with a statement that it is the sixth edition of Guthe-Wagner's text-book, it is really a new work, and one of the first importance. The introductory volume, dealing with general geography, now before us, is marked by only one defect, probably the result of the method of publication, the volume having been brought out in four parts spread over the six years 1894–1899. One result of this is a somewhat formidable list of errata for the earlier sections. The bibliographies in several instances stop short of the period of publication of important books now available for students which have for years superseded those recommended as the best. This is particularly true with regard to Chapter I. of the Introduction, which deals with literature bearing on geographical science as a whole. The remainder of the introduction is devoted to a brief but admirably concise account of the history of geographical theory, and to a study of the scope and sub-divisions of geography.

The historical chapter is of peculiar interest, for it deals with an aspect of the subject that has been very much neglected. We are familiar with histories of geographical exploration in which the successive steps of the opening up of the world to knowledge are described in great detail, but here we have a history of the development of geographical ideas, the successive stages of the opening of the human mind to a correct appreciation of the Earth as an object of study. We observe with more regret than surprise the small part which the English language has played as a vehicle for the progress of geographical knowledge. No one would wish to deny the claims of German, French, and Dutch writers to the leading place in the modern restoration of geography, but we are inclined to believe that English minds have not been so exclusively engaged during the last three centuries in collecting the facts of travel, and so oblivious to the importance of general ideas as is usually supposed.

Only thirty pages are occupied with the introductory matter, the value of which is far greater than the space it occupies would lead one to expect.

General geography is treated in four books, methodically subdivided into chapters, sections, and paragraphs. Prof. Wagner's work is the latest expression of the most accomplished student of geographical literature, and his system of classification may be viewed as representing the science of geography as it exists to-day; a resultant of the original

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* 'Lehrbuch der Geographie, von Hermann Wagner.' Sechste gänzlich umgearbeitete Auflage von Guthe-Wagner's Lehrbuch der Geographie. Erster Band. Einleitung. Allgemeine Erdkunde. Mit 84 Figuren. Hannover und Leipzig. Hahn'sche Buchhandlung. 1900.

views of many men. Hence we consider it right to give such an epitome of the contents as may serve as a skeleton for a complete system of advanced teaching of the principles of geography.

Taking the names *Erdkunde* and *Geographie* as exactly synonymous, Prof. Wagner shows that geography, considered as to its historical development, exhibits a distinct duality of character, looking on the Earth from one point of view as a physical body, from the other point of view as the dwelling-place of man. From the first point of view geography is a pure natural science depending on exact measurements; from the other it is a connecting bond between natural science and history. But this quality, although far-reaching, is not fundamental, and Prof. Wagner believes that the gap between the two points of view may be successfully bridged, and geography looked upon as a unity.

General Geography is treated under the following subdivisions:—

Book I. Mathematical Geography (193 pp.).

Chap. I. Direction on the Earth's Surface.—Direction on the horizon—Direction on the celestial vault—Direction on the surface of the Earth—Determination of geographical position.

Chap. II. The Body of the Earth.—Figure and size of the Earth—Physical characteristics of the Earth as a whole: mass and mean density, internal heat, terrestrial magnetism.

Chap. III. Movements of the Earth.—Rotation—Revolution—The Solar System—Gravitational interaction of celestial bodies on the Earth.

Chap. IV. Geographical Maps.—Projections—Map-construction and drawing (topography)—Measurement on maps.

Book II. Physical Geography (334 pp.).

Chap. I. The Earth's surface as a whole.

Chap. II. The Land.—Internal structure of the Earth's crust—Contemporary movements of the crust—Modification of the Earth's crust by external agencies—General results of destructive processes—Land-forms—Lakes and rivers—Coasts and islands.

Chap. III. The Oceans.—The bed of the oceans—Sea-water—Movements of the sea.

Chap. IV. The Atmosphere.—Temperature of the air—Atmospheric pressure and winds—Water-vapour and precipitation—Climate.

Book III. Biological Geography (87 pp.).—The Biosphere—Distribution of Organisms—General results of migration—Vegetation of the land—Plants and animals of economic value.

Book IV. Anthropogeography; or, the Earth and Man (189 pp.).—The Human species—Natural divisions of mankind—Classification of the human race according to civilization—States (political geography)—Chief religions and their distribution—Settlements and density of population—Trade routes and modes of transport—International trade.

This plan covers the field of geography fully, and follows what must

be held to be the natural order of the development of the subject, passing from one division to the next by the least abrupt transition. The greatest detail is given to the earlier and more fundamental questions involving measurement and differences of form, and considering the close but clear print and the concise style, these portions form the fullest and most systematic treatise on mathematical and physical geography with which we are acquainted. Facts and conclusions are stated, though rarely illustrated by descriptions of individual instances, and the number of pictorial and cartographic illustrations might have been increased with advantage. The references to literature on each branch of the subject are remarkably full, and, for German works, probably exhaustive. Excellent indexes complete the volume, but in spite of every care, several inaccuracies occur in these. The worst we have noticed is "Joudd, volcanoes, 208," where the name should be Judd and the page 268. Criticism of such minutiæ seems almost unjust when we consider the immense value of the work, the learning which it displays, and the thoroughly scientific and methodical plan on which it is arranged.

SOME UNPUBLISHED SPITSBERGEN MSS.

By Sir MARTIN CONWAY.

THE following documents seem deserving of a wider accessibility than they have possessed. Both Lancelott's and Gray's notes appear to be of about the same date, Lancelott's a little earlier than Gray's, say about 1660 or before. Both relate to the Bay Fishery, and do not refer to the killing of whales in the open sea. About the time of the foundation of the Royal Society the whale-fishery seems to have attracted much attention. In the MS. Register Book of the Royal Society (vol. ii. p. 76), under date December 17, 1662, are published a series of elementary "Enquiries for such as goe to Groenland, by Mr. Hoskins." Gray's replies in the same volume (p. 156) are addressed to a more elaborate series of questions, which were afterwards printed with little alteration in the *Philosophical Transactions* (vol. ii. p. 554). The following footnote is added to them in a neat handwriting in the copy in the Royal Society Library: "These have been since printed with Sir John Narborough's voyages * from Spitsbergen, 76 deg. N. lat. they sailed that year." I have seen it stated somewhere that, in the *Philosophical Transactions* for 1675, there is a reference to a circumnavigation of Spitsbergen. I have looked carefully through the book, and can find nothing to justify the statement. In Zorgdrager (German edition of 1750, p. 11) there is mention of a circumnavigation of Spitsbergen by Captain Goodlers in 1630; but no such exploit was accomplished by him (*vide* Pellham).

* London, 1694. 8vo.

BRITISH MUSEUM. MS. SLOANE 3986, ff. 78, 79.

An Account of Greenland from Capt. Lancelott Anderson a Hull-Merchant who has made 33 voyages thither.

1st that they usually went out of Hull in the Begining of May, and that it proved 3 weeks or 4 voyage to the place they went to which lay in 78 gr. of Latitude.

2dly that they sayld between great masses of Ice of 17 or 20 fathomes thick part of which stood out high above the level of the main mast, off which ran spouts of fair fresh water, when the sun shind upon them.

To some of these masses of Ice (which were of far lesser Bulk) they often times fastned their ship by the Ankor when the winds were higher than ordinary to hinder it for running too swiftly that it might not split it selfe upon those great ices.

3 that they caught their whales in some large Bay or other and particularly in the Bay call'd Bell Sound.* That they always swome to them in their Boates with harping irons of this shape to strike them: and always strive to avoyd their tayls (because with that part they strike and if they hitt a Boate will break it in pieces) but if you beare up to their head and foreparts, then are you more secure. The whales are there of quick hearing (though they have but little ears) and if they bee suddainly surprised will quake and shiver, and strive to avoyd you by sinking down into the sea.

After they are struck they presently dive and run down towards the Bottom.

Now their harping Irons are fastened to a Cord (which lyes coyled up in the Boate, so that it may not run fould.) of 300 fathom's.

Which the whale will draw all after it and they follow hir with the Boate which way soever shee draw the Cord: and it be not of length enough they are ready (with another Cord in another Boate) to fasten to the end of it before the whale has drawn it quite out to its full Length both of which may extend to 1000 fathom.

The whale will toyle and weary hirselfe thus till shee be weary or not able to stay longer under water (and she will sometimes stay 1 hower or more under water before shee appear at all) yea and will run under great Ilands of Ice which are floating there, but will come back againe to the open sea and aire.

Lastly when shee is dead and floates they lett hir alone for 2 or 3 days in which tyme shee swells and so a greater part of hir Back appears on the water:

Then they goe to hir and cutt off Collops of hir back as deepe as the fatt reaches: and as far as the water permitts. which done they turn up one side and then the Belly and lastly the other side and so spades hir round and then leaving the rest of the Body (except the whalebone which they take out of hir mouth) to the mercy of the sea.

Then they take these Collops and Boyle them in their Coppers and so the fat runs all into oyle.

And an ordinary whale will yeild 12 tun of oyle: some 20 tun (if large and taken at a seasonable time).

One strange observable more hee relates off those seas about June when they whales come in there is a certain kind of fruite exactly like Cow-Cumbers which rise in the sea and swim all over it in infinite quantityes (so that the sea swarms with them) and as soone as ever they observe those Sea-Cow-cumbers to arise,

* The definite statement that the English were still accustomed to make Bell sound, by which the modern Recherche bay is intended, their principal base, is important. The chief English resort in the early years of the Bay Fishery was Cove Comfortless (English bay), and the neighbouring shores and waters of Foreland sound, King's bay, and Cross bay.

they doe infalliblely prognosticate the commeing in off the whales, which are poore and leane at their first arrivall there (as he observd of the venison) but in 1 or 2 months will be exceeding fatt with eating and feeding as they suppose on these Cow-cumbers.

For hee has observed that the throat of these sort of whales is very narrow respectively to their great Bulk, so that one can hardly thrust their Arm down it: But it might extend to a much greater bore when hee was alive.

These Cow-cumbers are conceived to be a submarine fruite, which grow at the Bottom of those seas and when ripe doe drop off and so are boyd up immediately to the top of the ocean:

Hee observed they lessened number and grew fewer and fewer toward the latter end of their stay there.

Hee concludes it probable that the whales come into those cold northren seas to cast their young ones there: for he tells mee hee has seene many young ones with the old and once killd a mother-whale with a young one sucking on hir, which was as big as a horse, which they killd also.

Though their whale fishing be their maine end and designe of goeing thither, yet sometimes they make a considerable proffitt of sea-horse teeth, of which kind of Animal there is great plenty in those seas.

He says he has seen on the shore of those seas one or two long horns white and wreathed exactly like those wee call unicorn hornes, which was doubtlesse the horn of some fish cast there: and is that which passes for the soveraige antidote * of the world, for there is not such an animal in the world as that which is one of the Royall supporters in the Arms of England, which is commonly called the unicorn.

About 14 August the ☉ begins to sett and so it grows night little by little till the 13 of 7br till the night was then 5 howers long, and that is the longest any person can or dare stay there.

That the starrs have sometimes fairely appeared there on those so short nights: that there are often great mists for 10 days together.

That the grounds in Greenland are all mossy and live and thrive good long grasse and great store of sorrell, and scurvygrass, which is best about the sea-shores and tis observed grows where the wild foules dung. But not a tree or shrubbe to be seen on all the countrey, which is full of very high-hills which constantly are covered over with snow.

That there are fresh fish both in the sea and in the fresh waters and lakes (which have noe commerce with any other waters) in that countrey.

That there are infinite store of wild ducks and geese and other foule, which lay their eggs in the islands thereabouts which they fetchd by whole Boats-full at once for an excellent dainty: they all desert the country before the merchants come away.

That there are no creatures to be seen there but wild Deare foxes and Beares: the Deare as leane as can be when they come thither and in 2 months will be extraordinary fatt, which they kill for their meal and salt some and bring it over and hang their tongues and sell them here for a tainty.

That there was 8 men once † had the misfortune to be left all winter in

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* See 'The Embassy of Sir Thomas Roe' (W. Foster's edition), p. 290 and footnote. Hakluyt Society, London, 1899.

† This was the party whose adventures in 1630–1631 were more fully and accurately described in Pellham's 'God's Power and Providence' (London, 1631; Hakluyt Society's edition, 1855). Pellham merely states that they were relieved by two ships of Hull, but does not mention the captain's name.

Greenland, and that the next summer after it was hee and his ship had the fortune to relieve them.

That they were all alive and had kept an exact account of time.

That the occasion of their being left there the year before was this; they went up with Boates higher into the countrey to kill venison (which they kill there with doggs and guns) and stayd it seems too long so that the ship was gone away for England, before they returned into the Bay: which when they found, they began sometimes to crye out and lament their sad fate, other times to scold and fight: but at last with mutual persuasions to provide for so long and sad a winter (as was comeing on) and to that purpose went again up into the countrey to kill more venison, and after came home with 27 Bucks which they roasted very well (with the whale Collops formerly mentioned which they boyled their oyle with) and then caskd up for their use (for salt they had not).

That they made a shift to get a hogshead of oyle out of the religes of the whales which served them for Lamps (made of old ropesend there left) all the said winter.

That they got all the whale Collops they possibly could rake up together: and drew up their Botes (cutting them in pieces for their winter fewell):

That they made themselves a house halfe undergrown and halfe above and pulld down most of the Barne (where they Boyld their oyle) to build it with: and so sodded it extraordinary well over.

That in the cold and darke winter they had much Benefitt by the light of the moone and now and then caught foxes by Baytes (which came to their very hutt doore for they could not stir any way out (above 2 or 3 hundred yeards for looseing themselves and their hutt and being frozen to death to boot: which foxes proved very good meat.

That they once caught a Beare and eat off him roasted, but they had all like to have dyed of him.

That their drink was snow melted and their cask'd venison to their meat: which kept very well (for Capt Anderson tould mee hee tasted of it the year after when hee relieved them:

That the seas in those parts flow not above 4 foot high.

That the said 8 men were pale, leand, and ill-coloured when hee and his ship relieved them.

Register Book of the Royal Society, vol. ii. (1662, 1663) p. 156.

25 February, 1662.

Enquiries propounded to and answered by Mr. Gray; that hath been severall times in Grœnland. Brought in by Mr. Oldenburg.

1. What is the heat of the sun? etc.
2. What is then the most constant weather in summer? etc.

* * * * * *

6. What Currents there are, and which way they set, and how fast? whether they always run one way? Ans. There is but one constant Current; which sets away from the East-South-East, and runs up to the N.N.E., as far as 77 degrees latitude, where 'tis checkt; and from thence sets away again on the East-side of Greenland, between Duke's-Cove* and Greenland to the South-west; and then

* Duke's cove was therefore a bay in the east side of Wybe Jans Water (Stor fiord). In my large collection of tracings of Spitsbergen maps, I can only find it marked on one, "Carta particolare della Terra di Greneland." This is Carta 49 in the *Parte seconda del Tomo terzo* in the atlas called "Dell' Arcano del Mare di D. Ruberto Dudleo Duca di Nortumbria e Conte di Warvich: In Firenze Nella Stamperia

wheeling about the South-point of Greenland, sets up again N.N.W. to the Foreland of degr. Latitude, and then from the South-end of the Foreland, it drives away to the W.-N.-W. This current when there is much Ice upon the Coast is more forcible; but runs very easy, when the ice is gone from the Coast. It runs always one way.

11. Whether there be any pits or Mines? Ans. He knows of none but some Coalmines, which he had been digging in, not much beneath the surface of the Earth.

13. As to animals, birds, etc.

14. As to vegetables.

15. As to thunder.

17. As to fish.

18. Whether any people do, or have been known to stay there all the winter? and how they shifted? Ans. Once they themselves left * there, besides their intention, 7 or 8 men, that were gone a hunting; at which time they weighed anchor and went along the shoar, intending to meet them and take them in at a convenient place: but a wind and a fogg arising which made them lose the sight of land, and forced them to sea: their poor companions were left behind, but found alive at their next return, having lived upon Foul and Deer, and saved themselves from being frozen by the Coales they found there.

19. How neer any hath been knowne to approach the Pole? Ans. He told me, that once, he met upon the Coast of Greenland a Hollander, that swore he had been but halfe a degree from the Pole, shewing him his journall, which was also attested by his mate; where they had seen no Ice nor land, but all water.

This seems incredible (added in another hand).

REGISTER BOOK OF THE ROYAL SOCIETY, vol. ii. (1662, 1663) p. 308.

November 4, 1663.

The manner of the Whale-fishing in Grœnland. Given by Mr. Gray to Mr. Oldenburg for the Society.

[With 5 illustrations, in pen and bistre.]

We have according to the bignesse or smalnesse of our ships, the more or fewer Boates: a ship of 200 tuns, may man six boats; A vessel of 80 or 100 tuns, 4 boats; A Vessel of 60 tuns, 3 boats or more, not lesse; 3 boats being as few as may be with convenience to kill a whale. Each boat hath 6 men; A Harpeneir, Steersman, and four Oars; to which men the merchant giveth, (besides their wages) for every 13 tuns of Oyle (which we call a Whale) when there is so much for each

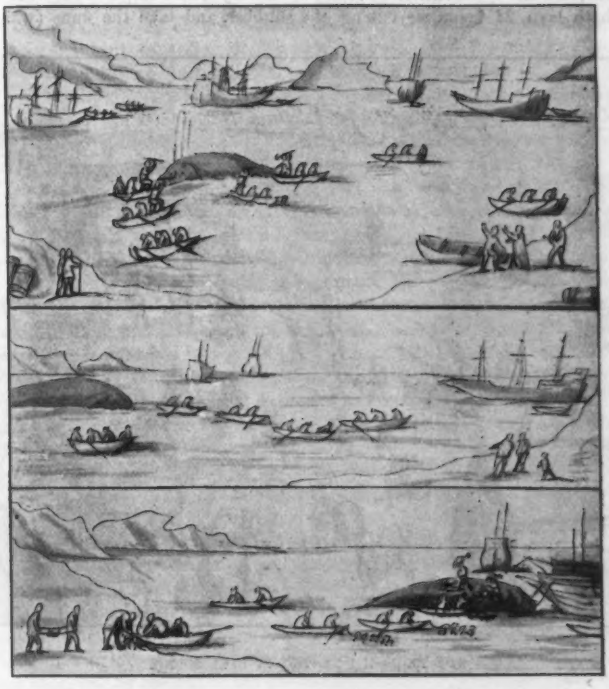
---

di Francesco Onofri: 1647." It is clear that this is a copy of an English map, but I have not yet found trace of the original. It resembles Edge's chart more than any other, but materially differs from it in important respects. Probably the map represents the ideas of some Hull skipper. The most energetic of the early Hull whalers was Thomas Marmaduke. He is sometimes referred to in Purchas as Duke, of Hull. He was one of the first men to resort to the east side of Spitsbergen, and Duke's cove was probably named after him. On the Florence map it is marked "Duckes Coue," with "Athale Hed" south of it, and "C. di Duckes Coue" north. It is the Gotha cove, apparently, which is marked on the Admiralty chart in the west coast of Edge island.

* These winterers were again Pellham's party of 1630–1631. Pellham distinctly says that the captain of the ship *Salutation* that abandoned them so recklessly was Master Mason. Gray was therefore one of Mason's company.

boate, to the Harpenier 6*li.* 10s., the Steersman 3*li.*, and to each Oar 30s., in all for each boat 15*li.* 10s., which we call whale-money.

We have several men and boats upon several convenient places, which we call *Look-outs*,* that constantly remain looking out by turnes for the Whale, which when we fish in Harbour, cometh into a smooth Bay, where is a good Harbour for our ships: And having discovered the Whale, which swimmeth with her back above water, or is descried by the water which she bloweth into the Air, one Lookout maketh signes to another, by hoysing up a basket upon a Pole, and then all the boats row after her and having opportunity to row up with her, before she goeth



ENGLISH BAY-FISHERY IN BELL SOUND, ABOUT 1650–1660.

down, strike a Harping-iron into her, to which is a staffe joyned being about 6 foot long, called a *harping-staffe*, to the Socket of which Iron is a white rope, with an eye seazed very fast: This Rope is about 5 fathoms long, which Lying upon the forepart of the Boat (which we call a Shallop) always coyled over a little pin, ready to take up, to give scope to the Iron, when it is thrown at the Whale; and to this hand-rope, is a warpe of 300 fathoms seazed, to veer after the whale, lest, when she is struck, by her swift motion (which is often down to the ground, where the water is 60, 70 or 80 fathom deep) she should sink the boat.

* Hence the various points named Lookout, or Uytkyk, on the older Spitsbergen maps.

Thus having gotten our Iron into her, out boats row where they think she will rise (after she hath been beating her selfe at ground) and get 2 or 3 irons more into her, and then we account her secure. Then when she is neer tired with striving and wearied with the boats and ropes, we lance her with long Lances, the Irons and stands wereof are about 12 or 14 foot long, with which we prick her to death; and in killing her, many times she staveth some of our boats, beating and flourishing with her tayle above water, that the boats dare scarce come nigh her, but oftentimes in an hours time she is dispatched.

Thus having killed her, our boats tow her (all of them rowing one before another, one fast to another like a team of Horses) to the ship's stern, where, after she hath layn 24 hours we cut off the Blubber, and take the finns (which we

THE ENGLISH "TENTS" IN BELL SOUND.

commonly call the whalebone) and her tongue out of her mouth, and with a great pair of slings and tackle, we turn her round, and take all that is good off her, and then we turn her carcass adrift and tow the blubber (cut in pieces) to the shore, where works stand to mannure (*sic*) it.

Having made fast the blubber to the shore, we have a *Waterside-man* who stands in a pair of boots, to the middle leg in water, and flaweth such flesh as is not clean cut from the blubber: Then we have two men with a Barrow,* that when the Watersideman hath cut it in pieces about two hundred weight, carry it up to a stage standing by our Works, like a Table; then we have a man with a long knife, who we call a *Stage-cutter*, who sliceth it into thin pieces about halfe an inch thick, and a foot long or longer, and throws it into a Cooler, we call a

* *Not* a wheelbarrow; *vide* illustration.

slicing-cooler, betwixt which and another Cooler (called a *Chopping-cooler*) we have men we call *choppers* placed; five or six men, who upon blocks cut about a foot and halfe square (made of the tayle of the Whale, which is very tough) do take the sliced blubber and chop it very small and thin, not above a quarter of an inch thick, and an inch or two long; and thrust it off from their blocks into the Chopping-Cooler, which holds two or three tuns: Then upon a Plat-forme is built a Copperhole, about 4 foot high, to which there is a stokehole, and on this Copperhole is a broad Copper, which containeth about a Butt, hanged with Mortar and made tight round the edges. And over the Stokehole, upon an Arch, stands a Chimney, which draws up the smoke and flame. And we have one we call a Tub-filler, who with a Ladle of Copper, whose handle is about 6 foot long, taketh the Chopt blubber out of the chopping-cooler and puts it into a hogshead made with strapps for that purpose, and he drawes this hogshead from the chopping-cooler's-side to the Copper and putteth it in; under which having once kindled a fire of wood and boyled a Copper or two of Oyle, the scruffe which remains after the Oyle is boyled out of the blubber (which we call Fritters) we throw under the Copper, which makes a feirce fire, and so boyleth the Oyle out of the blubber without any other fewell.

Then when we find that it is boyled enough, we have two men which we call coppermen who with two long-handled copper ladles take both oyle and fritters out of the Copper, about halfe, and put it into a Barrow (we call a Fritter-barrow) made with two handles and barrell-boards set about halfe-a-quarter of an inch one from the other, through which the oyle runneth and the Fritters remain; from which the Oyle being drained whilst another Coper of Oyle boyles, they are cast into the Stokehole and burnt, and the barrow stands ready again on the first Oyle-Cooler, to receive what is taken out of the next Copper. Out of this barrow the Oyle runs into a great thing we call a Cooler made of Deal-boards, containing about five tuns, which is filled within an inch of a hole (made in the side for the Oyle to run into the next spout) with water to cool the Oyle, and so the Oyle runs upon the water, through this hole into a spout about 10 or 12 foot long, into another cooler filled as aforesaid and out of that, through a long spout into a third filled as aforesaid and out of that, in a long spout into a Butt laid under the end of this spout, which being full, the hole of the Cooler, next the Butt is stopt till another Butt is laid under, and then the plugg being taken out, it filleth another, till we have done boyling: Then we fill up our Oyles, when they are thoroughly cold, and marke them and roule them into the water, rafting 20 together, and so tow them aboard, hoyst them into our ships, and stow them to bring them home.

And for our Finns, which grow in two Gumms in the whales mouth (whereof in a whales mouth, great and small are about 600, 460 whereof being merchandable) we cut them one by one out of the gumms and having rubb'd them clean we bind them up 60 in a bundle, and so taking account of them ship them aboard in our Long-boat.

Upon the shoar we have a Tent * for our Land-men, built of stone, and covered

* The description applies to the English settlement at Bell sound, and should be compared with Pellham's description of the same place. The illustration reproduced herewith from Gray's paper (p. 312), is evidently a rough representation of the Bell sound "tents," which, however, were much larger than here depicted. I have been unable to learn whether any remains of the foundations of these buildings can still be traced. They are to be looked for on the west shore of Recherche bay, in the flat ground between Fox point and Fox glacier. Perhaps some of the many tourists who now visit Recherche bay, with a few hours to spare there, would search for foundations, and let me know if they find any.

with Deals, and Cabbins made therein for our Blubber-men to lodge; And we have a great Working-tent with a Lodging-room over it, where, about 6 Coopers work, to get ready Cask to put the Oyle into.

p. 308 has a drawing inset.

p. 312 contains 4 drawings.

MEMORIAL TO DR. LIVINGSTONE.

It has long been felt desirable, by the many admirers of Dr. Livingstone, that the spot on which the great traveller breathed his last should be permanently marked by a suitable memorial. When, on the discovery by Mr. Weatherley of the precarious condition of the

THE MPUNDU TREE NEAR LAKE BANGWEULU, UNDER WHICH LIVINGSTONE'S HEART WAS BURIED, AND ON WHICH HIS NATIVE FOLLOWERS CARVED AN INSCRIPTION.

tree which marked the locality, it was decided by the Royal Geographical Society to take steps to secure the section of the tree bearing the commemorative inscription for safe-keeping in this country, it was hoped that arrangements might also be made for the worthy

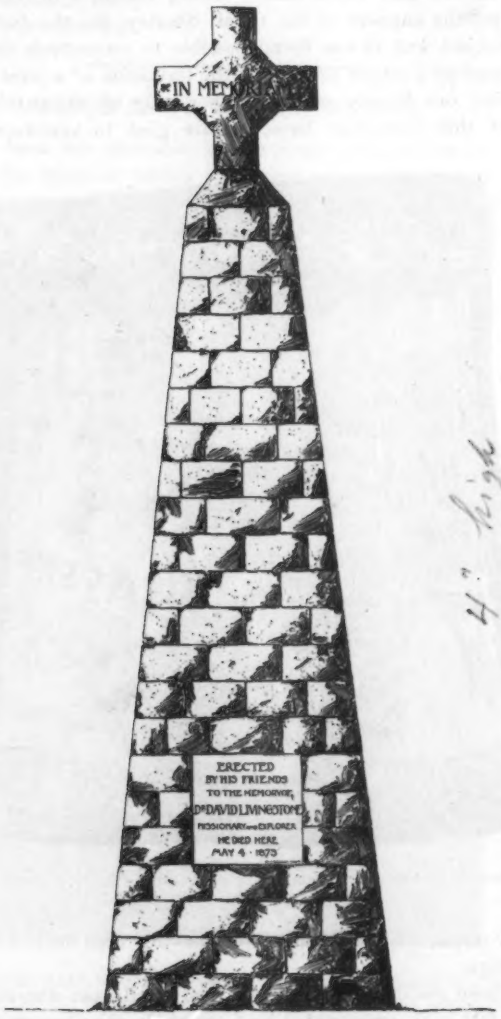
commemoration of a spot to which, in the eyes of Englishmen, an almost sacred character attaches. At the same time a movement had been set on foot, and funds raised, among residents in Nyasaland and others, with the support of Sir H. M. Stanley, for the furtherance of a similar object, and it was found possible to concentrate the efforts of all interested on a single scheme by the formation of a joint committee, representing our Society and the other body of sympathizers. The labours of this committee have, we are glad to announce, led to a

SECTION OF THE LIVINGSTONE TREE CONTAINING THE INSCRIPTION.

satisfactory result, all the arrangements having been made for carrying out the design.

It has been decided that the memorial shall take the form of an obelisk, 20 feet high, surmounted by a cross. In the absence of suitable stone in the region in question, the material chosen is the best concrete, which, it is thought, will be the most satisfactory from the point of view of durability. It will be taken out in 450 air-tight cylinders, each of 50 lbs. weight. Moulds, of oak with metal lining, have been prepared

for the formation of the blocks, of which over 300 will be used. Tablets, in blackened bronze, will be embedded in the blocks as moulded.



SKETCH OF THE MEMORIAL TO BE ERECTED TO LIVINGSTONE ON THE SITE OF THE TREE.

Two of these, placed on opposite sides of the monument, will bear the following inscription: "Erected by his Friends to the Memory of Dr. David Livingstone, Missionary and Explorer. He died here, May 4, 1873."

On the other faces of the obelisk two more tablets will be placed, on which the following will appear :—

> "This monument occupies the spot where formerly stood the tree, at the foot of which Livingstone's heart was buried by his faithful native followers. On the trunk was carved the following inscription: 'David Livingstone. Died May 4, 1873. Chuma, Souza, Mniasere, Uchopere.'"

The undertaking has met with the cordial support of the British South Africa Company, while its success may be considered assured through the co-operation of Mr. Alfred Sharpe, British Commissioner in Nyasaland, who has kindly made himself responsible for its execution. Mr. Robert Codrington, the company's representative in the Bangweulu region, has also shown himself active in furthering the necessary preparations. It will be remembered that to Mr. Codrington was due the securing of the section of Livingstone's tree—a mission with which he was entrusted by Mr. Alfred Sharpe, who, at the request of the Council, kindly agreed to act as the Society's agent. The task has been accomplished with entire success. The section has now arrived in this country and is deposited in the house of the Royal Geographical Society. The thanks of the Society are due to the British South Africa Company, who, through their representative, Mr. Codrington, have most generously carried out the Society's wishes in having the section transported from Central Africa to England. It is only fair to state that Mr. Alfred J. Brown, who designed the memorial, and has taken all the trouble to obtain and pack the material and design the moulds, has given his services gratuitously.

THE MONTHLY RECORD.

THE SOCIETY.

The Annual Awards.—The annual awards of the Society have been made as follows for the present year: The Founder's Medal to Captain H. H. P. Deasy, for the exploring and survey work which he has accomplished in Central Asia; the Patron's Medal, to Mr. James McCarthy, for his great services to geographical science in exploring and mapping all parts of the kingdom of Siam; the Murchison Award to M. H. Arçtowski, for the valuable oceanographical and meteorological work which he performed on the Belgian Antarctic Expedition; the Gill Memorial to Mr. Vaughan Cornish, for his researches on sea-beaches, sand-dunes, and on wave-forms in water; the Back Grant to Mr. Robert Codrington, for his journeys in the region between Lakes Nyasa and Tanganyika; the Cuthbert Peek Grant to Mr. T. J. Alldridge, for his journeys during the past ten years in the interior of Sierra Leone.

Retirement of Mr. Coles, the Society's Map Curator.—The announcement that Mr. John Coles, the Society's Map Curator and Instructor, has been compelled to retire, owing to failing health, will be received with sincere regret by all the Fellows of the Society. Mr. Coles has filled his important and responsible position for twenty-three years, and has discharged the duties of his post in a manner which has gained for him the unqualified approval of the Council, and the respect of all who have come into contact with him. The difficult task of keeping the Society's enormous collection of maps and photographs up to date, of maintaining order in their arrangement, and of affording assistance to the numerous Fellows and visitors who desired information, has been performed by Mr. Coles with complete efficiency. As an Instructor in the use of instruments and in practical topographical surveying, he passed many travellers through his hands; as a teacher he was probably unsurpassed. In these and other ways Mr. Coles has rendered great service, not only to the Society, but to the promotion of scientific geography. His retirement is a great loss to the Society. He will be succeeded in the map curatorship by Mr. E. A. Reeves, who has been assistant to Mr. Coles for twenty-two years. The Society's system of instruction has become so important under Mr. Coles that the Council propose to make it a separate department, under a competent official, who will devote his whole time to the work.

EUROPE.

Climatology of the Sonnblick Group.—Dr. Fritz Machaček (a pupil of Prof. Penck) contributes a paper on the climatology of the glacier region of the Sonnblick to the report of the *Sonnblickverein* for 1899, dealing specially with Eduard Richter's observations of the remarkably low level of the snow-line in the eastern part of the Hohe Tauern. The recent considerable developments in the system of observations, especially the increase in the number of summit stations, has provided a large quantity of new material. The glaciers cover, or covered in 1871, an area of 16 square kilometres (6·2 square miles) on the north side of the group, and about half as much on the south side. The mean elevation of the glaciers on the two sides is 2680 metres (8800 feet) and 2730 metres (9000 feet) respectively, the same as the position of the "climatic" snow-line. Above this level, say 2700 to 3100 metres (8900 to 10,200 feet), lie the catchment basins of the glaciers. Calculating from the rainfall, the yearly increase in thickness corresponds to from 14 to 17 metres (46 to 56 feet) of freshly fallen snow—as much as Heim allows for the Western Alps, and twice as much as Schlagintweit estimated at a time when few observations at high-level meteorological stations existed. The annual mean of temperature is +0°·1 C. (32°·2 Fahr.), and the summer mean 7° C. (44°·6 Fahr.) at an elevation of 2200 metres (7200 feet); at 2700 metres (8900 feet) the summer mean is 3°·6 C. (38°·5 Fahr.); and at the top of the Sonnblick, 3106 metres, or 10,190 feet, the annual mean is −6°·1 C. (21° Fahr.), summer mean, +0°·4 C. (32°·7 Fahr.). The new observations confirm Hann's supposition that the level of the snow-line changes from month to month within comparatively narrow limits. The lower edge of the snow-covering—the temporary snow-line—rises from 1400 to 1600 metres (4600 to 5200 feet) in April,

to 2400 to 2700 metres (7900 to 8900 feet) in July, and snow disappears from the valley slopes almost entirely in August. The rule that the snow limit rises towards the centre of the mountain mass holds good for the temporary as well as for the climatic snow-line. Slopes with southerly exposure are specially favoured; they are clear of snow half the year up to 2000 metres (6600 feet), and for 140 days to 2400 metres (7900 feet), while northerly exposures are only clear for 60 days at the same elevation. The proportion of snow removed from the "Firn" region by melting, estimated from the air-temperatures above freezing, is markedly greater in the glaciers exposed to the south than in those exposed to the north, notwithstanding similar precipitation and mean temperatures—a significant example of the importance of this element. The cause of the low level of the climatic snow-line—2700 metres (8900 feet)—is therefore primarily the abundant precipitation, which favours large Firn deposits; but the low summer temperature, preventing extensive melting of snow, is also an important factor. Great local variations of level—2600 to 2900 metres (8500 to 9500 feet)—are due to the conditions of exposure and the shadows thrown by the mountain masses.

Farming Industries of Bosnia and Herçegovina.—From the excellent and detailed publications on the agriculture and stock-rearing industries of Bosnia and Herçegovina, issued by the Austro-Hungarian Government (Sarajevo, official press, 1899), it appears that, according to the returns for 1895, more than 88 per cent. of the civil population, comprising about 220,000 heads of families, are engaged in farming industries. Of this number only 2·6 per cent. belong to the class of landed proprietors, while over 39 per cent. are independent cultivators, and 40 per cent. "Kmeten," or hereditary tenants, who, during the Turkish period, were to the landowners practically in the relation of serfs. Since 1885 the number of independent cultivators has increased, relatively to that of the "Kmeten," by almost 13 per cent. Bosnia and Herçegovina belong to the most extensively wooded countries of Europe, more than 52 per cent. of the surface consisting of forest (oaks and conifers), which is State property and under systematic control. Yet almost a quarter of the land (22 per cent.) is now under agriculture, the amount having increased by 7 per cent. in one decade. Gardens and orchards have likewise increased 23 per cent., and vineyards 18 per cent. The chief decrease is in pasturage, while forests and unproductive ground (the latter barely 2 per cent. of the whole) show but a slight decline. Taking the average of the five-yearly period 1892–96, the annual yield of corn has risen since 1882 from 1·2 to 3 million metric centners, the chief increase being in maize, the staple crop of the country, though the yield of wheat and barley has also risen. That of potatoes, which were first introduced by the Austrian troops in 1878, has, however, shown the greatest increase, amounting to 190 per cent. on the average of the first five years. Cattle, and especially sheep, abound, the latter having increased from 840,000 in 1879 to 3,230,000 in 1895, the number per square kilometre being 63 (163 per square mile), or twice that of the inhabitants. Goats number 1,450,000, cattle 1,150,000, the former being three times, the latter twice, as numerous as in 1879. Of swine there are 13 to the square kilometre (34 to the square mile). Sheep are most largely exported (130,000 head in 1879), but cattle and goats both show an increase of late years. Swine have, on the contrary, been less exported since 1894.

Rainfall of the Central Rhine Provinces.—The latest addition to the *Forschungen zur deutschen Landes- und Volkskunde* is a paper by Dr. P. Polis, director of the meteorological station at Aix, on the rainfall of the central Rhine provinces and the surrounding regions. The period covered by the material used is only the one decade 1886 to 1895, but the discussion has the merit, all too rare

in such investigations, of attempting to estimate the probable errors of the results: the mean uncertainty in differentiating one station with another is found to amount to about five per cent. A very clear set of maps shows the distribution of rainfall in the four seasons, and the percentage of the total annual fall received during each. The special points of local importance are pointed out, but some conclusions of general interest, based on the examination of this particular area, are suggestive when compared with the rainfall types recognizable in the British Isles. The rainfall is in the first instance determined by the distribution of pressure, condensation occurring in the ascending currents associated with low barometric pressure; and along with this the temperature and humidity, largely depending on the position with regard to sea and land, must be taken into account. Given the general conditions controlled by these factors, the local inequalities are primarily regulated by the surface relief of the region. Mountains cause a general increase of rainfall on their weather side, and diminution on their lee side; an increase of winter and autumn rainfall, and a diminution of summer rainfall. A maximum in October is due to the greater humidity of the atmosphere and the larger number of cyclones during that month. The increase of rainfall with height is closely connected with open position of mountains concerned; sheltered elevations of equal height diminish the rainfall. A mountain range diminishes the annual range of temperature on its weather side, and increases it on its lee side; hence on the former the winter rainfall, on the latter the summer rainfall, is increased. We may compare this with the west coast and the midland and eastern counties of England. The alteration of weather and lee sides due to the seasonal changes in the direction of prevailing winds tends to increase the winter rainfall on south-west exposures, and the summer rainfall on north-east exposures. Spring rainfall is increased on eastern slopes by the prevailing easterly winds. The long-period records of Aix show that snow falls most frequently in March, January coming second, and February third; but for the 1889–95 period January and February are the months of most frequent snow. The number of days of snowfall increases rapidly with increase of height. Old snow may give as much as 3·5 mm. of water per centimetre of depth, equivalent to nearly one-third.

ASIA.

Mr. D. Freshfield's Explorations round Mount Kanchinjinga.—The February number of the *Alpine Journal* contains a short sketch of the tour of Kanchinjinga carried out last autumn by Mr. Douglas Freshfield, accompanied by Mr. E. J. Garwood and Sig. V. and E. Sella. Darjiling was left on September 5, and after being hospitably received at Gantok, the capital of Sikkim, by the Political Resident, Captain Le Mesurier, to whom the party were indebted for the most valuable aid in arranging their transport, the travellers reached Lachen, on the road to the Donkia pass, on September 17. Here the horses were left, the route lying up the pathless gorge of the Zemu to the glacier which flows from the north-east base of Kanchinjinga. The great storm which did so much harm at Darjiling was encountered, at a camp at 16,000 feet, in the form of forty hours' snowfall, which prevented any attempt at high ascents. Proceeding north across the Tangchung La and The La passes, both over 17,000 feet, the party reached the lofty pasture valley of Lhonak,* Tibetan in character and uninhabited. Thence,

* This (*Proc. R.G.S.*, 1892, p. 613) is the upper Zemu valley of Hooker, while the Thlonok of that traveller is the stream descending from the Zemu glacier of White and Hoffman. On the 2 miles to the inch survey of India the Lhonak stream is called the Lanok Chu, the glacier stream the Pokie Chu, and the united streams the Zemu Chu.

after a visit to the Chorten Nyima pass (19,000 feet) leading to Tibet, the ridge running north from Kanchinjinga was crossed into Nepal by the only known pass, the Jongsong La, 21,500 feet according to the Government maps, 21,300 by the travellers' observations. On the farther side a great glacier runs first south, then west under Kanchinjinga into one of the heads of the Kangbachen valley. Five days were occupied in crossing from the stream of the Lhonak valley to the point where the ice was left in Nepal. At Khunza, Sir Joseph Hooker's Kambachen, the track of that traveller in 1848 was crossed. Since Hooker's visit, no European had visited this side of Kanchinjinga, owing to the difficulty of penetrating Nepal. Mr. Freshfield, however, met with a friendly reception at Khunza, the only permanently inhabited spot in Nepal he visited. A superb view across the Arun valley to the Mount Everest of English maps was obtained. Sikkim was again entered by the Kangla pass, and some days were spent in the neighbourhood of Jongri, whence the Guicha La, south-west of Kanchinjinga, was visited, and a view obtained of the 19,000-feet gap leading to the Zemu glacier. It appeared exceedingly steep and difficult on the south side. Mr. Freshfield speaks in glowing terms of the glacier scenery of the Sikkim Himalaya, and of the beauties of its vegetation. Signor Vittorio Sella and Mr. Garwood obtained several hundred photographs of the peaks and glaciers, the forests and flowers; and the latter, who is a member of the Council of the Geological Society, collected much information and the material for a physical sketch-map of the Kanchinjinga group. The Government maps were found to be incomplete in topographical detail at high altitudes on the eastern side of the range, and on the western, where they are based on the observations of native pundits, they proved wholly inaccurate.

Dr. Sven Hedin's Expedition.—News of the progress hitherto made by Dr. Sven Hedin in his present journey to Central Asia is given in the fourth number of *Petermanns Mitteilungen*. From Kashgar, which was reached on September 1, 1899, Dr. Hedin proceeded to Lailik, on the Yarkand-darya, for the purpose of entering on the first section of his programme—the exploration of the Tarim. Between September 15 and December 7 he navigated the whole river from Lailik to Janzi-koll, on Lob Nor, the result being a complete survey of the Yarkand-darya and the Tarim. At Lob Nor he met the French traveller, M. Bonin. Some weeks having been spent in the thorough exploration of the region of the lake, Dr. Hedin made his way to Cherchen, which he reached on January 12, 1900.

Typhoons of the China Seas.—The Manila Observatory has issued an important memoir on the typhoons of the Philippine region, by Father José Algué, S.J. The work is in three parts; first, a full discussion of the typhoon, the distribution of pressure within it, the wind-directions and clouds in its different parts, the progressive movements of the whole, and the general conditions under which typhoons are developed. Next comes an account of appearances associated with typhoons, particularly such as are of value in forecasting their approach; and, lastly, a detailed account of a selected number of typical and anomalous specimens of typhoons. One of the most important parts of the treatise is the practical application of the results obtained to ascertaining the position and motions of typhoons. A table of mean pressures for different areas and seasons is given, and a certain departure from the mean—which may be indicated by a red movable needle on a ship's barometer—marks the neighbourhood of a typhoon. With the help of a new instrument, called the baro-cyclonometer, it is then possible to determine the position of the centre of the typhoon, and with a second barometer-reading and observations of wind-direction, to find the direction of its motion. The cyclonometer, which consists of a dial representing a horizontal section through a typhoon, and three movable needles to be adjusted in accordance with the observations, is a

perfectly simple device, but should be a valuable aid in interpreting the indications of the barometer. Father Algué's full memoir is in Spanish, but a small pamphlet in English is issued along with it, describing the cyclonometer and its use in practical navigation.

AFRICA.

Return of Mr. Moore's Expedition.—The arrival of Mr. J. E. Moore at Mombasa, on his return from the scientific expedition to Tanganyika, was reported about the middle of May. The expedition is said to have been very successful, having carried out the proposed zoological investigations throughout the chain of lakes from Nyasa to the Albert Nyanza. The main result is the discovery that the marine forms of life found in Tanganyika do not extend to any of the more northern lakes, as had previously been thought possible. Evidence was collected that Tanganyika must have formerly extended farther both towards the Congo valley and towards the north and south. A successful ascent of one of the snowy peaks of Ruwenzori was made, and the results will be of much interest as affording a comparison with the phenomena of the other high peaks of East Africa.

Major Gibbons's Expedition.—Major Gibbons writes to us from Chienje, at the north-east corner of Lake Mweru, under date January 21, giving an account of his journey to that place from Lialui, on the upper Zambezi. The first section up-river was performed by canoe, the banks in this section being high, undulating, and well wooded, so that the landscape was most picturesque. Navigation is less obstructed than Major Gibbons had supposed, most of the rapids offering no obstacle to the passage of light-draught stern-wheelers. At Nana Kandundu, east of Lake Dilolo, porters for the route to the Zambezi sources were unobtainable, though any number could have been procured for the journey by the old trade-route to Garenganze. This difficulty had, however, been forestalled by Major Gibbons, who, before leaving Lialui, had procured five donkeys, which were driven along the river-bank during the voyage. The commencement of the rains rendered the land journey exceedingly difficult, but Major Gibbons retained his usual robust health. The ground rose in gradual undulations to an altitude of 5000 feet at the Zambezi source, and was covered with forest, with a little undergrowth. The neighbourhood of the Kapombo sources is exceptionally attractive, consisting of high undulating open downs, with bracing air and good pasture. The loss of two donkeys through the attacks of lions necessitated the abandonment of some of the ammunition and supplies, but the party held on, and when nearing the Mumbeshe overtook the Lemaire Expedition, in company with which the journey was continued for some time. The watershed, which was followed to the Lufira system, consisted of a high belt of undulating ground falling away to the north and south. A wild raspberry, similar to the English, was here met with, though apparently unknown to the north and south. Before reaching Lukafu station, Major Gibbons was attacked by dysentery, but soon recovered, and made his way in twelve days to Mpwetu, where he fell in with Mr. Weatherley, of the value of whose geographical work he speaks highly. Throughout the whole journey only one hostile demonstration was encountered, and this was soon brought to a friendly issue. Major Gibbons has continued his careful survey of his route, every change of direction being noted, and distances recorded, while star observations were always made when the state of the sky admitted. While travelling with Lieut. Lemaire he continued his work quite independently, but his results agree well with the astronomical longitudes fixed by the latter. He had met with courteous consideration at the hands of all the Congo State officials. At the time of writing, he was already on his way home *viâ* Lado and Khartum.

Dr. Donaldson Smith's Expedition.—A telegram has been received at the Society from Dr. Donaldson Smith, dated Gebel Ain, May 21. Gebel Ain is on the Upper Nile, and is probably the first telegraph station met with by Dr. Smith. He states that he has traversed the region between the river Omo (about 5° 30′ N.) to Fort Berkeley on the Upper Nile, and that he found no rivers "west of the Omo," that is presumably between the Omo and the Upper Sobat. His collections and maps, he states, are "good," and his companion, Mr. Fraser, is well.

Journey to Lake Mweru.—Through the courtesy of the Foreign Office, a recent report of Mr. Alfred Sharpe on a journey to Kazembe's and the Luapula has been communicated to us. It is accompanied by a detailed account, by Dr. G. D. Gray, who accompanied the expedition, of the country traversed, and by a sketch-map of the route. The journey was occasioned by the contumacy of the chief Kazembe, whose raids had been a constant cause of disquiet to the Mweru district, but who fled with his people across the Luapula before the arrival of Mr. Sharpe. A British station was established near the site of his town, to which his people soon began to return, and it is hoped that the country will now settle down, the whole Luapula valley down to 11° or 12° being thus thrown open to trade. On the Luapula, Mr. Sharpe was well received by the chief Kafimbi, a son of Kazembe. On the Nyasa-Tanganyika plateau Arab influence has almost disappeared, while the natives are no longer collected under influential chiefs, a fact which, though favouring peace, removes them to some extent from the control of the authorities. Labour is exceedingly difficult to obtain, and ox-transport, for which the greater part of the Stevenson road is suitable, is regarded as indispensable for the needs of the country. The route followed by the expedition lay for the most part through well-known country, but Dr. Gray's notes give some useful information regarding its present condition. From the south end of Tanganyika Mr. Sharpe took a more southerly route than that followed by him in 1892, crossing the Lofu in about 9° S., and travelling partly along a hoed road and partly by native paths. On the second day the high plateau was left, and the difference in temperature was most marked, the sun beating down more fiercely, while no cool breeze tempered its heat. The country was at first thickly wooded and little inhabited; afterwards several Awemba villages were passed. Mr. Sharpe reports that the Awemba country has lately been opened up both by the Chartered Company's officials and by the French missionaries, it having been divided up among petty chiefs on the death of Ketimkulu. Passing south of the Mweru swamp and crossing the Mkubwe, the largest and best running water between Tanganyika and Lake Mweru, Dr. Gray proceeded direct to the Kalungwizi station, while Mr. Sharpe turned aside to visit the swamp. The declaration of this as a game reserve was, he thinks, a wise step, and likely to prove effectual in preventing the extermination of the elephant. Dropping down into the Kalungwizi valley, Dr. Gray found the country more open and fertile. The valley was uninhabited during Mr. Sharpe's visit in 1890, owing to Arab depopulation, but since the establishment of the Kalungwizi station, natives have flocked to it from all parts. South of Kalungwizi, a thickly wooded country with many rubber trees was entered, and, being well watered, was free from the parched appearance presented by the plateau at the time—the close of the long dry season. The Luapula swamps, which were subsequently visited, were formerly a great haunt of elephants, but these are rapidly diminishing in number owing to the persecution by the natives. Other game has disappeared owing in part to the rinderpest. On the return journey, Dr. Gray visited Kilwa island, which he considers of much prospective value as a sanatorium. It is one of the most beautiful spots in the whole country, and on its plateaux, 600 feet above the lake, the air is cool and balmy, the soil dry, with short turf grass, and

dotted over with large shady trees. From Chienje station, near the north end of Lake Mweru, the return journey was made round the north side of the Mweru swamp. Beyond this the country was a series of high and low levels, giving the impression of having once been a lake region. A flowing river (the Chisela) seen by Mr. Sharpe in 1892, had quite disappeared, a fact which Dr. Gray thinks to favour the idea of a general desiccation of the country.

Lieut. Lemaire's Expedition.—A few additional particulars respecting the geographical results of the Belgian expedition to the southern borders of the Congo State are given in the *Mouvement Géographique* for April 15 and 29. From the village of Kazembe on the Lualaba the expedition reached the Nzilo falls, whence the route led north-west across the Lufupa to the Lubudi. This was ascended towards the south, but a westerly direction was afterwards resumed, and the Kuleshi, a more important stream than the Lubudi, was reached. On arrival at the Kasai (the Lukoshi having meanwhile been crossed), the expedition ascended that river and one of its affluents to Lake Dilolo. This is a vast swamp with no connection with the Kasai, while only after very heavy rains does it appear to communicate with the Zambezi through the Lotembwa. The line of parting between the Zambezi and Congo basins, which was crossed and re-crossed during the return journey, proved much better marked than has hitherto been supposed, no intercommunication between the two basins having been observed. The principal river crossed was the Mualaba, evidently the Lualaba of the Pombeiros, and of Arnot, Capello, and Ivens, though Lieut. Lemaire seems to imply that the Portuguese travellers placed its sources a degree too far south. The Kuleshi mentioned above as more important than the Lubudi is evidently the Lokoleshe of Arnot, who did not, however, speak of it as of exceptional size. M. Wauters considers that the information sent home by Lieut. Lemaire justifies his belief that the main branch of the West Lualaba, and, according to his view, of the Congo itself, lies west of the Lubudi, which name was originally, however, applied by him to the stream occupying the position of the Kuleshi. Lieut. Lemaire's full account must be awaited before these hydrographical questions can be entirely cleared up.

The Mashonaland Railway.—The resident engineer, Mr. Harry Good, writes and points out in connection with the map of the Mashonaland railway, published in the February *Journal*, that the railway was opened for traffic on May 24, 1899; also that the Beira railway is now being relaid to a gauge of 3 *feet* 6 *inches*, uniform with the Mashonaland railway and the South African system; this widening was expected to be completed in May. The original distance from Beira to Umtali by the former gauge (2 feet) was 222 miles, this distance will be reduced to about 207½ miles on completion of the widening, as several deviations have been made from the old route.

AMERICA.

Railway Project for French Guiana.—The issue for May 2 of the *Dépêche Coloniale* contains an account, by that journal's correspondent in French Guiana, of the proposed railway from Cayenne to the interior which has lately been under discussion in the *Conseil Général* of the colony. The scheme was set on foot by M. Levat, an engineer, to whom a concession for the railway for a period of ninety-nine years was voted in January last by the Colonial Chamber, the decision of which, it is hoped, will be upheld by the supreme authority. From Cayenne the line will proceed south up the valley of the Comté river, afterwards striking across to that of the Apruag, which it will ascend as far as the Saut Kanori. Here it will bifurcate, one branch running south and south-east to the Oyapok and the territory in dispute between France and Brazil, the other striking west for the Awa, the upper branch of the Maroni on the

Dutch frontier. The whole of the projected lines will have a length of nearly 400 kilometers (250 miles), but the section to be first taken in hand will extend only to the Arataye, a tributary of the Apruag (about 60 miles). Within this distance it will, however, traverse districts in which gold is already being mined. Great hopes are said to be based on the influence of the railway towards the development, not only of the mining resources, but of the agriculture of the colony. The latter has of late years been in no flourishing condition, but it is thought that with proper means of communication an era of prosperity will dawn for the fertile Isle of Cayenne, as well as for the forest industry of the interior.

Dr. Hermann Meyer's Second Xingu Expedition.—The main outlines of Dr. H. Meyer's latest expedition have already been given in the *Journal*, but the fuller account given before the Berlin Geographical Society in February last—and since published in the *Verhandlungen* (Nos. 2 and 3)—enables us to add more details. Of the various head-streams of the Xingu, the Kulisehu, Batovy, Tatoba, and part of the course of the Kuluene, had been explored by former expeditions; but in order to complete our knowledge of the hydrography of the river, the task of laying down the course of the Ronuro—one of the most westerly branches—remained to be performed. From the size of this river at its mouth, Dr. Meyer had been inclined to consider it the true upper course of the Xingu; but a difficulty existed in determining its place of origin, as the Formoso and Profundo, the only streams descending the northern watershed in this region which had not yet been explored, were ascribed by the Indians to the Paranatinga, a tributary of the Tapajos. The solution of this problem therefore formed—together with ethnographical research—the main object of Dr. Meyer's expedition. After various difficulties, Cuyaba was left in March, 1899, the route to beyond the Paranatinga following in the main ground already traversed by Dr. Meyer. As, however, he had set out before the close of the rains, the country, instead of the monotonous grey appearance which it had before presented, was decked in the freshest green. A deviation was made over the Serra Trombador in the tracks of a party of Cayabi Indians, who had for the first time made an incursion among the Brazilian settlements, and who will, Dr. Meyer thinks, cause trouble to the authorities unless wisely handled. From the summit of a hill beyond the Paranatinga, the clearness of the atmosphere allowed an extensive view over the unknown country to the north, in which direction countless streams seemed to converge on a dark strip of forest, which marked the course of the Rio Formoso. This Dr. Meyer determined to follow. Trees were found for building canoes, ten of which were ready in a fortnight, and the voyage was commenced on May 23. Dr. Meyer speaks in glowing terms of the beauty of the wooded banks of the river, which soon attained a large size. After eight days mountains closed in on either hand, the trees disappeared, and the flow of the stream became accelerated. Rapids were soon encountered, and presented almost insurmountable difficulties. Over a hundred and fifty frightful passages had to be made, ending in disaster thirty-five times, so that more than half of the total equipment was lost. By far the finest fall is that named "Bastian" by Dr. Meyer, which, with a drop of 50 feet, is the first great waterfall discovered on the Xingu. Finally, as already related, Indian villages were met with, the confluence of the Kuluene was reached and the return effected by that river and the Kulisehu. The chief problem now remaining is that of the origin of the Atelchu, which joins the Ronuro from the west. Dr. Meyer thinks that after his experiences no traveller will choose the Ronuro as a route to this region.

Physico-Geographical Aspects of the Nicaragua Canal Question.—In the March number of the *Bulletin* of the Geographical Society of Philadelphia,

Prof. Heilprin brings forward certain phases of the Nicaragua canal project, to which he thinks sufficient attention has not yet been paid. They are connected with the physical geography of the region through which the canal will pass, and especially with the volcanic phenomena, which, he thinks, may greatly endanger the existence of the canal, if made. Prof. Heilprin reviews the principal manifestations of volcanic activity which have occurred within the past century, and shows the small ground that exists for believing, with the supporters of the canal scheme, that the activity of the region is on the wane. He lays particular stress on the violent earthquake which agitated the whole of Nicaragua in April, 1898, as to which he quotes the opinion of Dr. Sapper that its character was purely tectonic, as against the view of Major Dutton, that earthquakes in this region are mere incidents of the volcanic activity. Another question of vital importance to the scheme is that of the level of Lake Nicaragua, which Prof. Heilprin shows, by comparison of the older with the newer surveys, and the analogy of other lakes both in Central America and elsewhere, to be in all probability inconstant, a fall of 15 to 20 feet having, it seems, taken place in the course of little more than half a century. Lastly, attention is called to the deformation of the Nicaragua coast-line by the rapid silting up of harbours, etc., a subject with which the permanency of the proposed canal is closely bound up. From all these facts Prof. Heilprin considers doubtful the advisability or practicability of a canal such as is contemplated, thinking that it may properly be questioned whether, if the canal had been constructed a century ago, it would be in existence to-day.

AUSTRALASIA AND OCEANIC ISLANDS.

Expedition in Western Australia.—An account of a prospecting expedition to the Barrow, Cavenagh, and Warburton ranges in Western Australia is given by Mr. Hugh Russel in a recent publication (vol. xvii., 1899) of the Victorian Branch of the Royal Geographical Society of Australasia. The party, consisting of Mr. H. V. Smith, Mr. F. W. Leech, and the author, with two natives, left Coolgardie on May 3, 1897, the route chosen being between that of Forrest in 1874, and of Lindsay in 1890. They followed the track by Mount Margaret to Kirkpatrick's Well, and then struck nearly due east for Mount Shenton. Thence an east-north-east direction was taken to Point Virginia (Wells), a large conglomerate "breakaway" with cliffs 50 or 60 feet high. After crossing the Salt Lake country, sand-ridges were encountered for nearly 100 miles, with occasional patches of mulga and desert gums, and a few quandongs and acacias, besides spinifex. On July 12, in lat. (by sextant) 26° 59′ 40″ S., a place which was called the Three Point conglomerate was reached; here there was plenty of water, as also kangaroo and rock wallaby. The Townsend ridges are described as a long narrow line of outcropping jasperoid rocks, running 50 or more miles, and highest at the western end. From Mount Squires, the highest point in Barrow ranges, trips were made in all directions. On August 29, travelling a little to the north of west, the party made for Elder creek, which they struck in about 60 miles, at its junction with the Hughes creek. The Warburton ranges from the watershed of Elder and Hughes creeks. Natives were met with in the Barrow and Cavenagh ranges, those of the latter being described as men of fair physique and in good condition. These ranges were prospected, but apparently with no success. On the return journey Coolgardie was reached on October 13. A detailed map of the route of the expedition illustrates the paper.

German Occupation of the Carolines.—The *Deutsches Kolonialblatt* for February 1 contains the report by Governor von Benningsen on his voyage round the Caroline, Palau and Marianne groups, made during the latter part of last year,

for the purpose of taking over the government from the Spanish authorities. It gives some interesting details as to the present condition and prospects of the new German possession. The eastern part of the Carolines was first visited, a German flag being left with the native chief of Kusaie, where, as everywhere, the new authorities were well received. The population is about 500, though formerly much greater. The people cultivate largely, and possess an excellent breed of cattle, which the governor thinks might be reared on a larger scale than at present. The production of copra might also be increased. At Ponape, possession was taken on behalf of the German Government with appropriate ceremonies. The port of Santiago is hardly suited to an extensive trade, and the seat of government might with advantage be removed to the much superior harbour of Metalanim. The reception accorded to the Germans was particularly friendly at Ponape, and the prospects of peaceable development are extremely good, the character of the people presenting a striking contrast to that of the New Guinea natives. The island is especially suited for the cultivation of vanilla and cacao. The Ruk Archipelago was next visited. The population is here fairly dense, being estimated at 15,000, and is still increasing, in spite of the constant civil wars. The people are little touched by civilization, but though firearms have been imported to some extent from Japan, have not hitherto molested Europeans. In the Palau group the population is likewise said to be increasing. The formation of the islands is very various. The smaller are often of a bee-hive shape, and composed entirely of coral. The larger are in part of volcanic origin, and in their upper portions present terrace-like flats, with no deep covering of soil, while the lower grounds show a rich layer of humus. The governor made an attempt to verify the existence of coal in the group, and though time did not admit of a visit to the deposits, which are said to occur on the southern part of Baobeltoab, specimens were obtained from the natives. The beds are said to extend for miles, and though the sample obtained was not altogether promising, better is said to exist. The existing charts of the group are said to be untrustworthy, and there is urgent need of a new survey, which would doubtless lead to the discovery of good harbours. At Yap many signs of progress were seen, and, thanks to the energy of the late Spanish governor, German enterprise will find a well-prepared field. The geological formation resembles that at Palau, and minerals may possibly be found. The last group to be visited was that of the Mariannes, where a landing was effected on Saipan and Tinian.

The "Albatross" Expedition to the Pacific.—The fourth and final letter from Dr. Agassiz to the U.S. Fish Commission (dated "Yokohama, Japan, March 5, 1900"), relative to the *Albatross* expedition, appears in *Science* of April 13. It deals with the cruise from Suva, Fiji, to Guam, one of the Ladrones, during which the Ellice, Gilbert, Marshall, and Caroline groups were visited. Owing to the unfavourable weather, but little deep-sea and pelagic work was done. A number of soundings were made from south of Nurakita, the southernmost of the Ellice islands toward the Marshall group, which indicate that the Ellice islands are isolated peaks rising from depths of from 1500 to over 2000 fathoms, and that the same is the case with the Gilbert islands. About thirty soundings were made between the atolls of the Marshalls. These islands rise from depths of from 2000 to 2500 fathoms. The atolls of the Marshall group are noted for their great size and the comparatively small area of the outer land-rims. Among the Carolines, one of the most interesting groups visited was the Truk archipelago. Dr. Agassiz is of opinion that this group owes its formation to submarine erosion, and not to subsidence, as at first sight might appear probable. Truk affords a good illustration of the important part played by the existence of a submarine platform in the growth of coral reefs. The author attaches great importance to the action of the north-east trade winds

in shaping the atolls of the different groups, and points out that the coral reefs are all situated practically within the limits of the trades both north and south of the equator. The line of soundings, run from the northern end of Namonuito to Guam, developed the eastern extension of a deep trough running south of the Ladrones. About 100 miles south-east of Guam, a depth of 4813 fathoms was obtained. This island is described in some detail. A number of birds, plants, insects, and reptiles were collected during the cruise, and a large number of photographs were taken illustrating the coral reefs of the Pacific.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Division of Geological Time.—We have received a reprint, from the *Journal of Geology*, of a paper, by Prof. T. C. Chamberlain, on the "Ulterior Bases of Time Divisions, and the Classification of Geologic History." Mr. Chamberlain examines the present state of knowledge in certain departments of geology and geophysics, with the view of ascertaining how far recent progress has indicated a direction in which we may look for a logical classification and division of geological time. It is recognized that if natural divisions resulting from simultaneous phases of action of world-wide extent can be detected, they must be accepted as the true basis of division. But it is taken as proved that there were no universal breaks in sedimentation or in the fundamental continuity of life, and that therefore if we seek for *absolute* divisions we shall seek in vain; the question is whether the continuity of physical and vital action proceeded by "heterogeneous impulses" or by "correlated pulsations." If the latter, the history of the earth assumes a "rhythmical periodicity susceptible of natural classification and of significant and rational nomenclature;" if the former, "the contradictory phases of local actions will inhibit all but the most general unity, and render classification and nomenclature either arbitrary or provincial." Prof. Chamberlain argues that the theory of "correlated pulsations" is probably the true one, and that on three grounds. First, great earth movements affect all quarters of the globe—this follows from the recognized causes of such movements, such as secular cooling, change of speed of rotation, etc. Second, the major movements of the Earth's surface have consisted of the sinking of the ocean bottoms and the withdrawal of additional waters into the basins, whose capacities are thereby increased. This leads to an examination of the nature of shrinkage movements, and brings the function of the continental shelf, with its profound influence on faunal distribution, into prominence. Third, the periodic changes taking place in the quantity of carbonic acid in the atmosphere, and consequent variations in climate. Here stress is laid on the periodic exposure of large areas of crystalline rocks to the atmosphere and their decomposition by weathering, although curiously enough little is said about the periodicity induced by the physical changes in the atmosphere themselves. Prof. Chamberlain is of opinion that along these lines it may be possible to arrive at adequate natural bases for the more important divisions of geological time. These may be subdivided in relation to the migration of faunas, or to special features of continental development, and in this way the present arbitrary systems may be largely eliminated.

POLAR REGIONS.

Dr. Nansen's Next Voyage.—Dr. Nansen has briefly described the programme of the voyage in the northern seas which he has undertaken for the present summer, in a note in the April number of *Petermanns Meitteilungen*. Its leader is Dr. J. Hjort, well known for his work in connection with the Norwegian fisheries and

oceanographical research, and its object is the detailed examination at all depths, from a physical and biological point of view, of the sea between Norway, Iceland, Jan Mayen, and Spitsbergen. Dr. Nansen hopes, with the help of the best modern instruments, to obtain accurate determinations of the constants of temperature and specific gravity of the ocean water at different depths, while Dr. Hjort will make the examination of the plankton of the sea-water, in part by new methods, his special task. The party will sail in a new steamer, the *Michael Sues*, which has been built specially for oceanographical research, and which will be placed at Dr. Hjort's disposal for the prosecution of the Norwegian section of the proposed international work in that direction. Dr. Nansen hopes that the new results will be of value as extending and explaining his researches during the voyage of the *Fram*.

Russian Arctic Expedition.—Baron Toll, the well-known explorer of the New Siberia islands, had, a year ago, worked out a plan for the exploration of the northern portion of the New Siberia archipelago, as well as of the hypothetical Sannikoff's land. The Russian Government and the Academy of Sciences have supplied the necessary funds, and the preparations have been pushed forward so energetically that the expedition is now ready to start. About its arrangements and plans Baron Toll has kindly communicated to us the following: A Norwegian whaler, *Harald Hårfager*, has been bought for the purpose, and she has been rechristened *Zaryá* (Morning Dawn). She has been re-arranged for her new purpose at the well-known wharf of Colin Archer, the builder of the *Fram*. The superstructure on the deck has been transformed into a spacious laboratory for zoological, bacteriological, and oceanographical work, and at the beginning of May the steamer started for St. Petersburg. Baron Toll will be the leader, as well as the geologist of the expedition; Lieut. N. Kolomeitsoff, who has won arctic experience in his journeys to the Ob and Yenisei, will be the captain. His second will be the Swedish lieutenant, T. Matthieson, geodesist and meteorologist, who took part in the Russian meridian-measurement expedition to Spitsbergen. Lieut. A. Koltschak, who has already made journeys in the Northern Pacific, will be the oceanographer; and A. Birulya, who also took part in the Spitsbergen expedition, will act as zoologist; F. Seeberg, a Swede, undertakes the astronomical and magnetic observations; and Dr. Walter, who took part in explorations along the Murman coast and in Novaya Zemlya, sails as surgeon, bacteriologist, and assistant-zoologist. The expedition will consist, all told, of twenty men, the crew being all Russians, Arkhangelsk fishermen. Baron Toll's travelling companion, the Cossack Rostorguyeff, will join the expedition as dog-driver and interpreter. Dogs are an important factor in a modern arctic expedition; sixty will be taken on board—forty of the West Siberian breed, and twenty of the very best of all Siberian breeds which is found about Ust-Yansk. Provisions are taken for three and a quarter years. Briefly stated, the plan of the expedition is the following: Early in June the *Zaryá* will sail from St. Petersburg to Tromsö, where she will stay for a while, as well as in the new Russian military harbour of Catherine, in the Kola peninsula. Thence the steamer will sail to the Yugor Strait in Novaya Zemlya, which the expedition intends to reach by the end of July—this being the best time for entering the Kara sea. As soon as this is done, they will sail for Cape Chelyuskin. The arctic sailing season being short, there will hardly be time left for advancing in the same year round the New Siberia islands, and Baron Toll intends, therefore, not to undertake this part of the voyage before the summer of 1901. He will winter the first year on the eastern coast of the Taimyr peninsula, in the north of Khatanga bay, in about 76° N. lat. This is certainly a good point of the programme, because the Taimyr peninsula,

which is nearly as big as all Sweden to the south of Laponia, remains still nearly unknown. About twelve months will then be at the disposal of the expedition for the exploration of the peninsula. If the conditions of the ice are favourable, the New Siberia islands will be circumnavigated in the summer of 1901. If not, a place will be found for wintering, and the winter of 1901–2 will be spent there. The third summer will be given to the return journey, and, if possible, it is intended to return *viâ* Bering strait to Vladivostok.

Lakes and Valleys of the Upper Nugsuak Peninsula, North Greenland.—Mr. T. L. Watson, who was a member of the Cornell University Expedition of 1896 to Greenland, has made a careful study of the lakes and valleys of the Upper Nugsuak peninsula, especially with regard to their origin and topography. His "Notes" on the subject are published in the *Journal of Geology* for October to November last. The peninsula is 25 to 30 miles long, averaging from 4 to 6 miles in width, and is characteristically rough and rugged, intersected by numerous fjords, which in many cases penetrate to the edge of the ice-cap. The results of glaciation are everywhere apparent. Much of the uncovered land is occupied by lakes. The largest of these are mostly confined to the large valleys, while many tarns are scattered over the higher ground. These lakes appear to owe their origin largely to glacial action, and are, with possibly one or two exceptions, true rock basins. As a class the valley lakes observed on the peninsula range in size from over a mile in length down to the smallest-size basin. They varied from a few feet to 150 feet in depth. Soundings were taken of the largest lakes, and two showed their beds to be considerably below sea-level. Two types of valleys were observed on the peninsula. The larger of these are described as being very deep and broad, and somewhat U-shaped in section. The facts collected pointed to the conclusion that this type of valley was due to differential preglacial decay, with subsequent ice-erosion. The second type of valley is of minor importance on account of slight development, and can be classed as strike valleys.

GENERAL.

The Development of Habitable Lands.—Under this title, Dr. Mill has contributed to the *Scottish Geographical Magazine* (March, 1900) a careful study of the conditions which should govern the opening up of new lands within the temperate zone to European civilization. By development he understands "such a treatment of its natural resources as will enable the land to continue to support its inhabitants as their number increases;" regarding as foreign to the investigation, the endeavour to extract from a country the largest possible present gain, without regard to the wants of future generations. Thus considered, the process is essentially one of securing a permanent adjustment of people to the land on which they live, and the problem to be solved is that of enabling a country (or association of countries, such as the British Empire) to become or continue self-supporting. Dr. Mill considers the natural resources of such a country under the heads of (1) materials for food and clothing derived from reproducible vegetable (and animal) sources; (2) material for houses, implements, machinery, etc., coming chiefly from the limited resources contained in the Earth's crust; (3) the power of doing work, obtainable without risk of exhaustion only from the forces of nature due, directly or indirectly, to solar radiation. He shows how a due proportion must be maintained in drawing upon these several resources, none being unduly developed to the detriment of the others. The attempt to work only the most profitable resources of a country and to rely on external supplies for the rest, must, under existing laws of human society, be attended with risk. After a sketch of the influence of geographical conditions in determining the relation of the people to the land in old countries,

Dr. Mill proceeds to consider the case of a new country just appropriated by a civilized power. Its proper development will demand, in the first place, a stock-taking of natural resources by a complete system of surveys; and in the next, the provision of serviceable communications, the wise selection of sites for towns, and the proper adaptation of their street plan to the ground, and, most important of all, the introduction of the right sort of inhabitants. In considering some of the complications which may have to be faced, Dr. Mill makes some remarks on the mutual relations which should prevail between higher and lower races, showing alike the wickedness of treating the latter as people without rights, and the folly of regarding them as in every way capable of equal treatment with Europeans. As mentioned above, it is to the development of new lands only that attention is directed in the paper, and the more difficult problem presented by lands incapable of self-support is not entered into. In the main, Dr. Mill is, by the nature of his subject, limited to a strictly utilitarian point of view, small consideration for the requirements of the artistic sense being, it is to be feared, possible in the supposed prosaic struggle for the satisfaction of more material wants.

OBITUARY.

Field-Marshal Sir Donald Martin Stewart, Bart., G.C.B., G.C.S.I., D.C.L.

Sir Donald Stewart was born in 1824, at Forres. He was the son of Mr. Robert Stewart, one of the Stewarts of Fincastle, who traced their descent from King Robert II. During his boyhood much of his spare time was spent among the fishermen of the coast, and it was then that he acquired that love of the gentle craft and skill with the rod which he never lost, and which took him in later days year after year to spend his holiday in Canada. Entering Aberdeen University, he proved his ability as a classical scholar before a cadetship landed him in India (1840), as lieutenant in the 9th Bengal Infantry, of which, much to his credit as a smart officer, he shortly became adjutant. In 1854 he saw his first service on the frontier; but it was the Mutiny of 1857 which gave him the first real chance of proving the soldierly grit that was in him. On June 18 of that year he set out on his perilous (and now famous) mission of carrying despatches from Agra to the camp of the Delhi field force, which he succeeded in reaching in safety. He was with Colin Campbell at the relief of Lucknow, and subsequently with the Rohilkand Brigade, and after the suppression of the Mutiny joined the Staff Corps. His next service was in Abyssinia in 1868, where, though employed on the line of communications, he, like Roberts, both maintained and consolidated his reputation.

After promotion to the rank of major-general, Stewart was selected by Lord Mayo for the responsible task of governing the Andamans, which under his able administration became transformed into a well-regulated industrial colony. In 1875 we find him in command at Lahore, and in 1878 he was selected for the chief command of the Southern Afghan field force when the war broke out—a command which involved the highest political as well as military responsibility. The passage of the Khojak range, the occupation of Kandahar, and the final advance in 1879 by the Kalat-i-Ghilzai road to Cabul, in the face of an active enemy, are matters of history. The crisis was encountered at the place known historically as Ahmad Khel, where Sir Donald Stewart fought his one great battle, winning a brilliant victory. His eventual retirement of 7000 troops by the Khaibar, a movement which involved great risk, was no less brilliantly carried out. He had likewise

proved himself a most able diplomat throughout the difficult political negociations with Afghanistan. As commander-in-chief in India, Sir Donald saw the conquest of Burma effected, and he practically inaugurated the modern system of posts and communications on the north-west frontier. He was a consistent advocate and supporter of geographical mapping, the advantages of which both for administrative and military purposes he fully grasped. An immense amount of topographical work was done under his command in Afghanistan, and to this extent he claims recognition as a geographer. On leaving India in 1885, he was placed on the India Council, and became field-marshal in 1894. At his death, which occurred on March 26, he held the post of governor of Chelsea Hospital.

Sir Donald's kindly nature and innate simplicity of character, no less than his shrewd good sense, won him many warm friends, whom, whatever their rank or position, he was always glad to welcome, or to help with a kind word of advice. His heart was ever young, and he would be "commandeered" by his youngest grandchild as readily as by a viceroy. Few of the distinguished guests at "Snowdon," where Sir Donald reigned as military chief of India, were aware of the spirit of fun that would occasionally break loose in that happy-hearted household when "the coasts were clear." To the end of his days he remained alike unhardened by trial and unspoiled by success. He married, early in life, a daughter of Commander Dabine, R.N.; and five children (two sons and three daughters) survive him. His eldest son, Norman Stewart, succeeds to the baronetcy.

Lieut.-General A. H. Pitt-Rivers, D.C.L., F.R.S.

The death occurred early in May of Lieut.-General Lane-Fox Pitt-Rivers, well known for his valuable work in the field of ethnology. The deceased general was a son of Mr. W. A. Lane-Fox of Hope Hall, and was born in 1827. Entering the army in 1845, he served with distinction in the Crimean war, being present at the battle of the Alma and the siege of Sebastopol. He became major-general in 1877 and lieut.-general in 1882. General Pitt-Rivers' taste for ethnology was early aroused, for when only twenty-five he commenced the collection of objects illustrating the life of savage man, which eventually reached such extensive proportions, and which he presented to the University of Oxford. Succeeding to the Rivers estates in 1880, and adopting the name and arms of Pitt-Rivers, the general devoted his leisure to the investigation, by excavations and otherwise, of the interesting archæology of the country round Rushmore, in Wiltshire, publishing the results in a series of volumes. He was for some years President of the Anthropological Institute, and took an active part in the proceedings of the British Association. He had been a member of our Society since 1859, and had served for a time on its Council.

CORRESPONDENCE.

The Map of Central and Southern Manchuria.

THE following notes may be of use to those consulting the Society's new map of Central and Southern Manchuria, published in the September number of last year.

The localities shown on the La-Lin—Sansing road are unknown. There is a mountain track to Ma-yi-ho, which I have followed for some 30 miles; but the regular road passes through Pin-cho, striking the river Ma-yen-ho at a small walled town called Ma-yi-ho.

From this town the river flows for 48 miles in a north-westerly direction, joining the river Sungari at Nan-tien-munn. Between Nan-tien-munn and Sansing the

country is mountainous and unbridged torrents frequent. I was told at this village that there was no road along the right bank of the Sungari to Sansing, and consequently had to turn west and cross the river at the regular ferry at Pu-yang-mu, and so reach Sansing by the right bank.

The A-shih-ho river joins the Sungari to the south-west of Hulan. The A-shih-ho-Hulan road crosses this stream a few miles north of A-shih-ho. On this road should be shown the large Russian settlement of Harbin, where the railway across Manchuria forks, one branch to Nikolsk and Vladivostok, the other to Kwan-chüng-tzu and Port Arthur.

The road from Kuan-chüng-tzu passing through Lung-wan (called by its official name Nung-an-cheng on the map) strikes the valley of the Sungari about 30 miles from Petuna, a little south of Kong-ye-fu, a charming semi-Mongol settlement nestled in an elm grove. Thence, though the river makes several bends towards the east, it runs generally parallel to the road. The latter has a forward bearing of 334° to Hsin-chüng, or Petuna.

The very prominent shoulder given to this river above Petuna, with the road shown as bearing to the east of north, is not correct; the direction of this road is truer in the 1887 map.

The river Hsin-Kai has been omitted. This is a shallow muddy stream about half a mile wide, which, flowing from the west, joins the Yi-tung-ho river about 8 miles to the south of Lungwan.

The road to Kwen-chüng-tzu leaves the imperial Kirin-Mukden road at the village of Ta-shwei-haw, 20 miles west (by road) of Kirin. I am inclined to think that the Imperial road is shown as bending too much to the east, which places Yi-tung-cho in too high a latitude. This town can scarcely be north of 43°–20′, because by a rough compass sketch I found that Kwan-chüng-tzu is practically in the same latitude as Kirin. Now, Yi-tung-cho is 36 miles by road from Kwan-chüng-tzu, but the direct distance on the map is only 20 miles, which, with every allowance for sinuosities, is too short; either Kwan-chüng-tzu is further to the north or Yi-tung-Cho further to the south than shown on the map. I believe the latter to be the case.

If this deduction be correct, then Kai-yuan should be more to the east, and the same with the valley of the Liu-ho or Hwei-fa; in fact, the position of Chao-yang-chüng is probably 20 miles east and slightly to the south of the position assigned to it. This would place Kwan-Kai in about lat. 43° N. and long. 127° E., for the Whei-fa does not take such a northerly course as shown on the map, as proved by its road distance from Kirin, about 80 miles. On the map the direct distance between these places is shown as 37 miles, whereas in the position I assign to Kwan Kai its direct distance from Kirin would be 56 miles.

I may mention that the general course of the Sungari above Kirin is south-easterly. I drove on the ice up to its junction with the La-fa river, and from that point saw that the Sungari came through the mountains from a south-easterly direction. Doubtless it makes a large bend back to the junction of the Wheifa, but I doubt, except perhaps in its upper reaches, that, after leaving the immediate neighbourhood of Kirin, its course is ever west of long. 127°.

The late Governor of Kirin told me that his jurisdiction extended down the Imperial road to Wei-yuan-phu-munn (marked on the map as Wu-Yuan-fu). As its name indicates, it is a gate where tolls are levied on goods passing between the provinces of Kirin and Shunn-King. The willow fence has long since disappeared, but the gates remain, and very summary punishment is meted out to any who attempt to evade the tolls by passing the provincial frontier at any other points.

The provincial boundary between the provinces of Kirin and Shunn-King follows

the crest of the hills which separate the Imperial from the Kwan-chŭng-tzu—Kai-yuan road, crosses the former road as above stated at Wei-yuan-phu-munn, turns north-east to the Chao-yang-shan, thence south-east, crossing the Whei-fa valley midway between Chao-yang-chŭng and Hei-shih-to, and so to the great northern bend of the river Yalu. While on the subject of boundaries, it may be well to notice that the province of Shunn-King is not shown as extending up to the Great Wall at Shan-hai-Kwan, though all other maps indicate this as the boundary of Manchuria; certainly the 'Official Chinese Gazetteer' shows the divisions of Chung-ho-so and Chung-chien-so as included within the chou of Ning-yuan.

The little town of Hsin-min-tun, or Hsin-min-ting, as it is designated in official parlance, has recently attained European notoriety, and, as the present terminus of the Shan-hai-Kwan—Chin-cho railway extension, has some claim to be correctly shown on the map. From a commercial point of view, it is of importance to note that it is 8 miles distant from the river Liao. The Imperial road from Mukden to Shan-hai-Kwan crosses the Liao at 32 miles from the capital, and then, turning west by south, continues for 8 miles before the little town is reached. It is also shown too far to the west; the map places it at 39 miles in a direct line from Mukden, though the road distance is at the outside 40 miles. A more correct position for this town would be lat. 42°, long. 122° 50′.

The main road from Liao-yang passing over the Mo-tien-ling to the mouth of the river Yalu, should be shown as roughly running along the parallel of lat. 40° as far east as long. 124°, when it turned south to Feng-hwang-Hwang-chŭng. It will be seen that on the map there are two places named Lien-shan-Kwan on separate roads. These are one and the same place on the same road. Lien-shan-Kwan is the village where the Mo-tien-ling road turns southwards. The map might be made more correct if the main road between Ta-tung-ku and Feng-hwang-chŭng were deleted, and shown as passing through the more northerly of the two Lien-shan-kwans.

The road from Sai (not Sa)-ma-chi to Lien-shan-Kwan should stand; it was used by the Japanese in 1894, when they advanced to reconnoitre the Motien-ling pass. But, to be accurate, it should be shown as joining the Feng-hwang-chŭng—Mo-tien-ling road a few miles south of Lien-shan-kwan, at a village called Tsao-ho-ku, which must, I think, be identical with the place shown on the map as Chao-huo-ku. The Ai-kiang join the river Yalu near Chiu-tien-chŭng, and Feng-hwang-chŭng is on a tributary of this stream.

As regards the very prickly subject of the spelling of names,* apart from typographical errors, it is observed that the orthography generally used by English-speaking people has not been invariably followed. Thus, Hsin (new) in Hsin-ch'ĕng (Petuna) and Hsin-min-tún is spelt Shin. In a recent diplomatic note it is spelt Sin; but the generally accepted spelling is Hsin, and certainly both of these more nearly approach the native pronunciations than Shin. Another less defensible innovation appears in the word *Chou*, which has been written *Chau*. To an ear untrained in the subtleties of Chinese tones this particular monosyllable resembles "jou" in sound. The conventional method of expressing this sound in English has hitherto been *chou*. *Chou* may be a nearer approximation to the true sound than Canton is to Kwang-tung, but it is merely a question of degree, hence the futility of deviating from the conventional spelling in order to approximate more closely the true pronunciation. No system has yet been devised to satisfactorily reproduce Chinese sounds and tones with English letters, and whether the un-

* The Council have adopted certain rules for spelling Chinese geographical names, which as far as possible have been given effect to above.—Ed. *G.J.*

initiated European says *jou*, *chou*, *chau*, *tshon*, or *tcheon*, he will be equally unintelligible to the Chinese.

In concluding these notes, I take the liberty of congratulating the Society on having supplied its Fellows with an extremely useful map of Central and South Manchuria, and one which is a distinct advance on any that has yet appeared. Manchuria is a most interesting country, favoured by nature with a splendid climate and a luxuriant soil, helped by an active and vigorous race, and beyond a doubt rich in mineral wealth; it is destined some day to become what nature has intended it to be—one of the richest and most flourishing countries in the Far East.

G. F. Browne, Lieut.-Colonel,
Military Attaché in China.

Shanghai, March 7, 1900.

The Map of Kashmir.

I have recently read with interest and pleasure a book lately published on sport and travel, named 'A Summer in High Asia,' by Captain F. E. S. Adair, late Rifle Brigade, for many of its pages recalled to memory a people and country I once saw much of. As I am responsible for the accuracy of the map of a part of Kashmir territory I am about to refer to, I trust I may be permitted, after a reference to my journal and original map, to reply through the medium of the Geographical Society's *Journal* to the following extracts. On p. 56, when in Camp Kande in the Hushe valley, Captain Adair writes, "An old man eventually told us that a small ravine that we saw opening up to the west, and which was apparently closed by a big mountain about a mile from its mouth, turned a corner and became a large valley, which had never yet been explored by a white man (this I believe to have been true, as I found on this occasion only that the Government survey was not correct), and was full of ibex." On his return through the same village, on p. 76, this valley is again referred to: "I found on this occasion, the only one during the whole of my trip, that the Government map was incorrect. The entrance to the valley is most curious; it runs east and west, and looks as if it were a narrow nalah (watercourse) about a mile long, and closed by a big mountain. However, the volume of water pouring down the stream denotes a ravine of some length; and indeed, on reaching the head of the apparent *cul-de-sac*, you find that the river takes a bend at right angles, the valley running about north." These remarks convey to the reader an impression that a very important valley had neither been seen nor mapped by the surveyor.

The Hushe Loomba or valley, which is one of the main tributaries of the Shayok, receives the drainage of four great glaciers, viz. the Aling, Masherbrum, Atosur, and Nanga, descending from that remarkable vast semicircle of lofty peaks commencing on the west of the Hushe valley with B_{13}, Zoah (21,207 feet), to K_1, Masherbrum (25,676 feet), K_6 (25,119 feet), K_7 (22,764 feet), K_8 (23,906 feet) on the east side. This tributary was explored by me in 1860, and surveyed by plane-table on the scale of 4 miles to the inch. I entered it from the Thulle valley, another main tributary of the Shayok on the west, crossing the dividing lofty ridge of 19,000 feet and upwards, and descending to Kande. Fortunately, I have a photograph copy of my original plane-table work of this part of Baltistan made in the surveyor-general's office, Calcutta. This shows the valley visited by Captain Adair, that joins the Hushe river at Kande, quite true, meeting it with an east and west course, turning towards the northward after about a mile; even the path leading to the grazing-grounds referred to is entered. The name I received for

this lateral valley was the Apo-brok. I see, on reference to the engraved atlas sheet of this part of Kashmir territory, this name is inserted, but not the path up the ravine; not being a main line of communication, I presume it was omitted. I do not know what Government map Captain Adair had with him. I may say here I did not go up into the grazing-grounds, and he was probably the first white man to do so; but I saw the whole valley well when I ascended the peak of Chungoksigo (18,848 feet) on August 17, 1860. This peak is situated south-west of Kande, on the southern watershed of the Apo-brok, which was seen from the junction with the Hushe river up to the glaciers at the head of it, the largest branching into three smaller ones under peak B_{18}. In mountains such as these little can be seen from the depths of the valleys on the grazing-grounds, and it is only by ascending to points high up on the main ridges, from whence the great peaks laid down by the triangulation work become visible, that an accurate position can be fixed on the plane-table, and the surrounding minor peaks, pinnacles, and other topography sketched in. Thus, in this valley—the Hushe, the least-known ravines to me are those joining the Hushe river on the east or left bank, of which the Ngamah is one joining it also close to Kande village. I did not penetrate into one of them; their courses were sufficiently well seen from points on the mountain spurs west of the river. These side valleys are not very accessible; most of it is terrible ground, with the swollen streams and rock shoots, but for purposes of sport some might no doubt be visited. Ibex are very abundant in this part of the country, and I read in my journal that I counted no less than forty together in a ravine below Chungoksigo peak. Shooting was out of the question; my whole time and attention had to be devoted to the survey work, for the days of summer, when high points can be ascended, are very limited.

To those who do not know how the survey was conducted, and discover in parts shortcomings in the Kashmir survey maps, I may say at once many such can be found, and that it might, for the scale, be shown in far greater detail; but what would it have cost, and what may be the value of this mass of rock and snow and ice far away from the lines of communication? I could point out the head-waters of many large rivers, and details of the highest ground that were never visited, but sketched from a distance—ground which during the last forty years has, no doubt, been penetrated by officers on shooting-expeditions. I can recall how often it was impossible to get into such ground, and how many contingencies might occur to prevent it, such as the absence of the usual rope or wooden bridge, when there was no time to construct another; the melting of the snow bridges; heavy rain or snow, swelling the rivers and closing passes; the dearth of provisions when a certain point had been reached; and, in those days, the apathy and even passive opposition of ill-disposed local officials, leading to the bolting of all the male population of a village. All this had to be contended with. On account of the great expense this survey entailed, a certain limit of time had to be given to the topography, much of which therefore comes under the head of reconnaissance, although I think it may well be termed reconnaissance of the first order, as it is free from all accumulating errors. Many officers who annually visit Kashmir and penetrate into its more remote valleys in search of sport, have a sufficient knowledge of surveying to correct and improve the topography of the existing maps of this and other portions of the Himalayan range. They might submit this information to the Surveyor-General's office. If the amount of error was large, it would be worth while deputing some regimental officer (partly for purposes of instruction) to execute a piece of plane-table work over the area in question, to be embodied eventually in future editions of the map. To gain an eye for ground and grasp its capabilities in attack and defence in a broad way, so essential to successful military

operations in a mountainous country, no work is more valuable or instructive than surveying with a plane-table. I wish all our officers (who are naturally good draftsmen) could have this training put in their way, and I see no difficulty in organizing such a system, particularly in India.

H. H. Godwin-Austen.

Nore, Godalming, April, 1900.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1899–1900.

Tenth Ordinary Meeting, April 30, 1900.—Sir Clements Markham, K.C.B., President, in the Chair.

Elections.—*Bernard F. Hall, M.A.; William Knighton S. Keavington-Weston; Sydney de Courcey Thompson, F.Z.S.; Edmund Tydeman; Charles Hunter Ward; William Nance Williams.*

The President said: We are honoured this evening by the presence of His Majesty the King of Sweden and Norway. We do not receive him here as an august visitor, but as one of our colleagues and as one of the most illustrious of our honorary members. His Majesty is well known to us all for the interest he has always taken in geographical science, and for the liberal and enlightened way in which he has supported and encouraged expeditions for exploration and discovery in unknown countries. It has been my duty and my great pleasure to present to two subjects of His Majesty, the Queen's Royal award, after their return from dangerous and most important expeditions, which were supported and encouraged by their sovereign. But we have never before had the great honour and pleasure of receiving His Majesty here in person. I hope it may not be the last time, and in your names I offer to him a most hearty and most cordial welcome.

H.M. the King of Sweden and Norway: Sir Clements Markham, I beg to return my very sincere and heartfelt thanks for the greeting with which you have received me. I am happy to assist at a meeting of this learned and highly distinguished Society, of which I feel it a really great honour to be an honorary member.

The President: We have the pleasure of welcoming here two of our foreign gold medallists, Major Wissmann and Captain Binger. You will be interested to hear that we have received the piece of wood containing the inscription which was carved on the tree under which Dr. Livingstone's heart was buried, by his African boys.

The Paper read was:—

"Through Africa from the Cape to Cairo." By Ewart S. Grogan.

Eleventh Ordinary Meeting, May 14, 1900.—Sir Clements Markham, K.C.B., President, in the Chair.

Elections.—*Don. F. Avelino Aramayo, Bolivian Minister; Thomas Bowyer Bower, A.M. Inst. C.E.; F. W. Carey; Percy Irwin Clark; James B. Halcrow; Major Arthur E. Hay, late R.A.; Major Thomas George Johnson, I.S.C.; R. D. Oldham, Supt. Geol. Survey of India; Owen Arthur Parrack; Horatio Gibbs Powell; Colonel James Gardner Stowe, Consul-General for the United States; Robert T. Turley.*

The Paper read was:—

"The Anthropogeography of British New Guinea." By Prof. A. C. Haddon, F.R.S.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., LL.D., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. = Memoirs, Mémoires.
Met. = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Austria-Hungary—Surveys. *Z. Ges. Erdk. Berlin* **34** (1899): 425–445. **Stavenhagen.**

Die geschichtliche Entwickelung des österreichischungarischen Militär-Kartenwesens Von W. Stavenhagen.

A sketch of the history of the official surveys in Austria-Hungary.

Belgium. *B.S.R.G. d'Anvers* **23** (1900): 421–441. **Haulleville.**

De la nécessité d'une plus grande Belgique. Par M. A. de Haulleville.

An appeal for the expansion of Belgian interests in China.

France—Dauphiné. *Annuaire Club Alpin Français* **25** (1898): 101–113. **Lory.**

A l'Obiou, quelques notes d'un touriste géologue. Par M. P. Lory. *With Illustrations.*

France—Dauphiné. **Marcheval and Guillemin.**

Annuaire Club Alpin Français **25** (1898): 515–543.

Tournée d'un intendant dans le Haut-Dauphiné en juillet 1762, manuscrit inédit de Pajot de Marcheval, publié et annoté par M. Paul Guillemin.

France—Mount Ventoux. **Barrême.**

La Géographie du Mont-Ventoux. Mémoire présenté au Congrès de Géographie tenu en Septembre 1898 à Marseille. Par Eug. Barrême. (Extrait du Bulletin de la Société de Géographie, tome xxii., nos. 1 et 2.) Marseille, 1899. Size 10 × 6½, pp. 38. *Presented by the Société de Géographie, Marseilles.*

France—Pas de Calais. *B.S.G. Lille* **33** (1900): 55–63. **Vermersch.**

Les Excursions de la Société de Géographie de Lille en 1899. Au pays de la houille. Excursion aux Mines de Bruay, 8 Juin 1899. *With Map.*

Notes on the coalfield of the north of France.

France—Pyrenees. *Annuaire Club Alpin Français* **25** (1898): 242–284. **Salomé.**

Amélie-les-Bains. Par M. Th. Salomé. *With Illustrations.*

France—Var. *Annuaire Club Alpin Français* **25** (1898): 371–430. **Nœtinger.**

La vallée du Var. Par M. Fernand Nœtinger. *With Illustrations.*

Germany. *Petermanns M.* **45** (1899): 283. **Langhans.**

Geographische Verbreitung von Industrie und Landwirtschaft im Deutschen Reiche. (Begleitworte zu Tafel 18.) Von Paul Langhans. *With Map.*

Germany—Meteorology.

Veröffentlichungen des Königlich Preussischen Meteorologischen Instituts. Herausgegeben durch dessen Direktor Wilhelm von Bezold. Ergebnisse der Niederschlags-Beobachtungen in den Jahren 1895 und 1896. (Maps, pp. lviii., 210, and 212.) Ergebnisse der Beobachtungen an den Stationen II. und III. Ordnung im Jahre 1899 zugleich Deutsches Meteorologisches Jahrbuch für 1899 Beobachtungssystem des Königreichs Preussen und benachbarter Staaten, 1899. Heft i. Size 13 × 10, pp. 62.
1895. Heft iii. Ergebnisse der Beobachtungen an den Stationen II. und III. Ordnung im Jahre 1895 zugleich Deutsches Meteorologisches Jahrbuch für 1895 Beobachtungssystem des Königreichs Preussen und benachbarter Staaten. Berlin: A. Asher & Co., 1899. Size 13½ × 10, pp. xx. and 99-314. *Map.*

Iceland. *G. Tidskrift* **15** (1839): 71–87. **Bruun.**

Arkæologiske Undersøgelser paa Island. Foretagne i Sommeren 1898 af Kaptajn Daniel Bruun. *With Plans and Illustrations.*

Observations on the ancient buildings of Iceland.

Italy. **Orsi.**

Modern Italy, 1748–1898. By Pietro Orsi. (The Story of the Nations.) London: T. Fisher Unwin, 1900. Size 8 × 5½, pp. xxiv. and 401. *Map and Illustrations. Price 5s. Presented by the Publisher.*

Italy—Vesuvius. *Atti R.A. Lincei Rendiconti* **8** (1899): 276–281. **Matteucci.**

Sulla causa verosimile che determinò la cessazione della fase effusiva cominciata il 3 luglio 1895 al Vesuvio. Nota del Prof. R. V. Matteucci.

Mediterranean. **Black.**

Narrative of Cruises in the Mediterranean in H.M.S. *Euryalus* and *Chanticleer* during the Greek War of Independence (1822–1826). By William Black. With an Appendix on the Climate, and Meteorological and Nosological Tables. Edinburgh: Oliver & Boyd, 1900. Size 9 × 6, pp. xii. and 356. *Illustrations. Price 14s. net. Presented by the Publishers.*

In a preface, Dr. W. G. Black explains that the manuscript of a journal kept by his uncle during naval service in the Mediterranean in 1822–26 having recently come into his hands, he considered that its historical interest makes its publication advisable.

Mediterranean—Crete. *P.R. Artillery I.* **26** (1899): 519–539. **Simpson.**

With the International Field Force in Crete, 1897. By Major H. C. C. D. Simpson, R.A. *With Map.*

Russia.

The Russian Journal of Financial Statistics, 1900. Specimen Number. St. Petersburg, 1899. Size 10½ × 7, pp. 236.

This new journal, published in English at St. Petersburg, is intended to supply British and American readers with accurate statistics, and a portion of this specimen number is occupied with instances of errors made in various publications in rendering Russian figures. There is no statement as to whether the *Russian Journal* is an official or a private undertaking.

Spain—Balearic Islands. *Annuaire Club Alpin Français* **25** (1898): 431–452. **Vuillier.**

La Sierra de Majorque et les nouvelles cavernes de Manacor. Par M. Gaston Vuillier. *With Illustrations.*

Spain—Early Maps. **Marcel.**

Gabriel Marcel. Les origines de la Carte d'Espagne. Extrait de la *Revue Hispanique*, Tome vi. Paris, 1899. Size 10 × 6½, pp. 36. *Map. Presented by the Author.*

A critical study of the maps of Spain from the thirteenth to the sixteenth centuries.

Sweden—Boundaries. *Ymer* **19** (1899): 283-331. **Kjellén.**

Studier öfver Sveriges politiska gränser. Af Rudolf Kjellén.

On the political boundaries of Sweden considered historically.

Sweden—People. *Ymer* **19** (1899): 405–408. **Retzius.**

Om de af Svenska sällskapet för antropologi och geografi föranstaltade antropologiska undersökningarna i Sverige. Af Gustaf Retzius.

Anthropometric results of the measurements of Swedish recruits.

Sweden—Temperature. *Ymer* **19** (1899): 221–242. **Ekholm.**

Sveriges temperatur förhållanden jämförda med det öfriga Europas. Af Nils Ekholm. *With Maps.*

On the mean atmospheric temperature of Sweden with maps of isotherms and isanomalous lines for January and July.

Switzerland. *Annuaire Club Alpin Français* **25** (1898): 201–241. **Cuënot.**

A travers le Canton d'Unterwald. Par M. Henry Cuënot. *With Illustrations.*

Turkey—Kosovo. *Abh. G. Ges. Wien* **1** (1899): 327–372. **Oestreich.**

Reiseeindrücke aus dem vilajet Kosovo. Von Dr. Karl Oestreich. *With Map and Illustrations.*

Turkey—Macedonia. **Ilitscheff.**

Ein Beitrag zur Geographie von Makedonien. Inaugural-Dissertation der Hohen philosophischen Fakultät der Universität Leipzig zur Erlangung des Doktorgrades vorgelegt. Von Dimiter Chr. Ilitscheff. Leipzig: B. Georgi, 1899. Size 9 × 6, pp. 48. *Presented by Prof. Ratzel.*

A monograph on the geography of the province of Macedonia, taking account of all aspects of physical and political geography.

United Kingdom. ———

Mines and Quarries. General Report and Statistics for 1899. Advance Proof (subject to correction) of the Tables relating to the Output of Coal and other Minerals and the number of persons employed at mines worked under the Coal and Metalliferous Mines Regulation Acts during the Year 1899. London, 1900. Size 13½ × 8½, pp. 12. *Presented by the Home Office.*

United Kingdom—Agricultural Census. *Fortnightly Rev.* **67** (1900): 591–601. **Bear.**

The Next Agricultural Census. By William E. Bear.

Suggestions for the inclusion in the schedules of the forthcoming census of headings for the more accurate determination of the status of the various elements of the agricultural population.

United Kingdom—Channel Pilot. **King.**

The Channel Pilot. Part i.—South Coast of England, originally compiled by Staff-Commander John W. King, R.N. Ninth Edition. London: J. D. Potter, 1900. Size 9½ × 6, pp. xx. and 450. *Index Chart. Price* 2*s.* 6*d. Presented by the Hydrographer, Admiralty.*

United Kingdom—England. **Mossman.**

Quarterly J. R. Meteorolog. S. **25** (1899): 330–334.

The Average Height of the Barometer in London. By R. C. Mossman.

Discussion of observations to complete the gaps in Mr. Eaton's monumental discussion of barometric pressure in London, and to extend these so as to take account of one hundred and twenty years.

United Kingdom—Meteorology. ———

Report of the Meteorological Council, for the Year ending March 31, 1899, to the President and Council of the Royal Society. London: Eyre & Spottiswoode, 1899. Size 10 × 6, pp. 136. *Map. Price* 7½*d.*

United Kingdom—Scotland. **Watt.**

A History of Aberdeen and Banff. By William Watt. Edinburgh and London: W. Blackwood & Sons, 1900. Size 8½ × 6, pp. xvi. and 438. *Maps. Price* 7*s.* 6*d.* net. *Presented by the Publishers.*

An interesting volume which, although accompanied by several maps, pays perhaps the absolute minimum of attention to the geographical conditions which largely guided the historical events that are recorded in its pages.

United Kingdom—Scotland. *Quarterly J. Geolog. S.* **56** (1900): 198–204. **Blanford.**

On a Particular Form of Surface, apparently the Result of Glacial Erosion, seen on Loch Lochy and elsewhere. By W. T. Blanford. *With Illustration.*

This is referred to in the *Journal* for May, p. 530.

United Kingdom—Wales. *Geolog. Mag.* **7** (1900): 58–61. **Dakyns.**

Some Snowdon Tarns. By J. R. Dakyns.

This is referred to in the *Journal* for May, p. 530.

ASIA.

Asia—Historical Peoples. *Rev. Scientifique* **13** (1900): 173-178, 204-207. **Saint-Yves.**

Les peuples retrouvés de l'Asie Centrale. Par M. G. Saint-Yves.

The findings of this paper are discussed by M. Zaborowski in the same review, pp. 466-467.

China. ———

China. No. 1 (1900). Further Correspondence respecting the Affairs of China. London: Eyre & Spottiswoode, 1900. Size 13 × 8½, pp. xxiv. and 412. *Plan. Price* 3*s.* 7½*d.*

Diplomatic dispatches written during the year 1899.

French Indo-China—Annam. **Sainson.**

Ngann-nann-tche-luo. Mémoires sur l'Annam. Traduction accompagnée d'un lexique géographique et historique. Par Camille Sainson. Péking: Imprimerie des Lazaristes au Pé-t'ang, 1896. Size 10 × 6½, pp. viii. and 582. *Price* 16*s.*

Translation of a book written in the beginning of the fourteenth century by an Annanese refugee in China, named Li Tsi. The translation is accompanied by notes and a geographical index.

India. **Maunder.**

British Astronomical Association. The Indian Eclipse, 1898. Report of the Expeditions organized by the British Astronomical Association to observe the total Solar Eclipse of 1898, January 22. Edited by E. Walter Maunder. London: Hazell, Watson, & Viney, Ltd., 1899. Size 10 × 6½, pp. xii. and 172. *Illustrations. Presented by W. H. Maw, Esq.*

Particulars of the observations of the solar eclipse of 1899 in Talni, Buxar, and Jeur.

India—Baltistan. *Alpine J.* **20** (1900): 3-10. **Bullock-Workman.**

Two Pioneer Ascensions in Baltistan. By Mrs. Bullock-Workman. *With Illustrations.*

India—Bengal. ———

List of Proceedings, etc.: Bengal, 1859–1897. Preserved in the Record Department of the India Office, London. London: Printed by Eyre & Spottiswoode, 1899. Size 13½ × 8½, pp. iv. and 40. *Presented by the India Office.*

India—Himalaya. *Alpine J.* **20** (1900): 1-3. **Freshfield.**

The Tour of Kanchinjinga. By Douglas W. Freshfield.

Mr. Freshfield and Mr. Garwood, with the Signori Sella, left Darjeeling on September 5 last year, and made a journey round Kanchinjinga, crossing the Jongsong La, a pass of 21,500 feet, and returned to Darjeeling on October 25.

India—Kashmir. **Neve.**

Picturesque Kashmir. By Arthur Neve. Illustrated by Geoffroy W. Millais. London: Sands & Co., 1900. Size 10 × 8, pp. xvi. and 164.

A graphic account of Kashmir written by a medical missionary of the Church Missionary Society. The scenic grandeur of the country is illustrated by Mr. G. W. Millais' photographs.

India—Marine Survey. ———

Administration Report of the Marine Survey of India for the Official Year 1898–99. Size 13 × 8½, pp. 18. *Presented by the Survey.*

India—Wrecks. **Falle.**

Return of Wrecks and Casualties in Indian Waters for the year 1898. Prepared by Commander P. J. Falle. Calcutta, 1899. Size 13 × 8½, pp. 84. *Chart and Diagram.*

Indian Ocean—Christmas and Cocos-Keeling Islands. **Baxendale.**

Christmas and Cocos-Keeling Islands. Report for 1899. Colonial Reports, Annual No. 286, 1900. Size 9½ × 6, pp. 16. *Price* 1*d.*

Indian Ocean—Christmas Island. **Andrews.**

A Monograph of Christmas Island (Indian Ocean): Physical Features and Geology. By Charles W. Andrews, B.A., etc., with descriptions of the Fauna and Flora by numerous contributors. London: Longmans & Co., 1900. Size 9 × 6, pp. xlv. and 338. *Map and Illustrations. Presented by the British Museum.*

After an account of the history and physical features of Christmas island by Mr.

Andrews, there follow eighteen articles by specialists on different zoological groups, ten articles on botany, and five on geology and palæontology. There is a bibliography of the island, and the monograph is illustrated by numerous maps and drawings.

Japan—Earthquakes. **Omori.**

J. College Sci. Imp. University Tōkyō **11** (1899): 389–437.

Notes on the Earthquake Investigation Committee Catalogue of Japanese Earthquakes. By F. Omori, D.SC. *With Maps and Diagrams.*

Japan—Earthquakes. **Sekiya.**

J. College Sci. Imp. University Tōkyō **11** (1899): 315–388.

The Earthquake Investigation Committee Catalogue of Japanese Earthquakes. Superintended by the late Prof. S. Sekiya.

Malay Archipelago. *Petermanns M.* **45** (1899): 290–292. **Wichmann.**

Die Insel Miangas. Von Prof. Dr. A. Wichmann.

On the controversy as to the identity of the island "Meangis," first described by Dampier.

Malay Archipelago—Celebes. *Petermanns M.* **45** (1899): 249–260, 273–280. **Bücking.**

Beiträge zur Geologie von Celebes. Von Prof. H. Bücking. *With Map.*

Persia. *Ymer* **19** (1899): 187–201, 243–264. **Falk.**

Persien, folk och stat. Af A. Falk.

Philippine Islands. **Doyle.**

Observatorio de Manila. Tifones del Archipiélago Filipino y mares circunvecinos 1895 y 1896. Estudio de los mismos por el P. Juan Doyle S. J. Manila, 1899. Size 12½ × 9, pp. 106. *Diagrams.*

Russia—Caucasus. ———

Die Cypriniden des Kaukasus. Tiflis, 1899. Size 10 × 7, pp. viii. and 158. *Plates. Presented by Dr. G. Radde.*

Russia—Siberia. *Meteorolog. Z.* **17** (1900): 28–32. **Woeikof.**

Temperatur und Bewölkung am Ufer des Baikal und auf den benachbarten Höhen. Von A. Woeikof.

Comparison of meteorological observations at two stations on Lake Baikal and one at a considerable elevation on the neighbouring mountains.

Straits Settlements. **Swettenham.**

Straits Settlements. Report for 1898. Colonial Reports, Annual No. 287, 1900. Size 10 × 6, pp. 20. *Price* 1½*d.*

Turkey—Armenia. *Verh. Ges. Erdk. Berlin* **27** (1900): 128–133. **Rohrbach.**

Herr Dr. Paul Rohrbach: Armenier und Kurden.

Discusses the difficulty of estimating the number of Armenians and Kurds in the Turkish dominions in the absence of authentic statistics. The author suggests one and a half million Armenians in the country and a quarter of a million in the towns of the Turkish empire as a probable approximation.

Turkey—Asia Minor. **Deryugin.**

Zoo-geography of the country watered by the Chorok. By K. M. Deryugin. [In Russian.] Size 9 × 6½, pp. [66]. *Presented by M. Venukoff.*

Turkey—Asia Minor. **Maercker and Schäffer.**

Z. Ges. Erdk. Berlin **34** (1899): 363–407.

Beiträge zur Erforschung Klein-Asiens. I. Das Stromgebiet des unteren Kyzyl Yrmak (Halys). Von Hauptmann G. Maercker. II. Erkundungen und Routen-Aufnahmen im Gebiet des Kyzyl Yrmak und des Jeshil. Von Hauptmann Schäffer. III. Bemerkungen zu den Karten. Von Hauptmann Maercker. *With Maps.*

AFRICA.

Algeria. *B.S.G. de l'Est* (1899): 357–374. **Collesson.**

Cinq jours en Kabylie et aux gorges du Chabet-el-Akra. Par P. Collesson.

Algeria—Wargla. *Ann. G.* **9** (1900): 141–153. **Blanchet.**

L'oasis et le pays de Ouargla. Par M. P. Blanchet.

British Central Africa. *Scottish G. Mag.* **16** (1900): 235–245. **Robertson.**

The Commercial Possibilities of British Central Africa. By Patrick Robertson.

British South Africa. *National G. Mag.* **11** (1900): 81–96. **Hilder.**

British South Africa and the Transvaal. By F. F. Hilder. *With Illustrations.*

German East Africa. **Oechelhaeuser.**

Die Deutsch-Ostafrikanische Centralbahn. Von Wilhelm Oechelhaeuser. Berlin: J. Springer, 1899. Size 9½ × 6½, pp. xvi. and 120. *Map.*

Plan of a projected railway from Bagamoyo and Dar-es-Salaam to Tabora, and thence in two branches to Ujiji, on Lake Tanganyika, and to the extreme south of the Victoria Nyanza.

German East Africa—Kilimanjaro. **Meyer.**

Der Kilimandjaro. Reisen und Studien von Prof. Dr. Hans Meyer. Berlin: D. Reimer (Ernst Vohsen), 1900. Size 12½ × 8½, pp. xvi. and 436. *Map and Illustrations. Price* 25*m. Presented by the Publisher.*

This splendid volume is described by the author as a jubilee offering, since his last visit to Kilimanjaro in 1898 took place exactly half a century after the discovery of the mountain by the German missionary Rebmann. One of the most interesting features in the very thorough study which Dr. Meyer has made of the mountain is the investigation of the glaciers, of which he has obtained very striking photographs.

German South-West Africa. *Petermanns M.* **45** (1899): 281–282. **Fleck.**

Meine Reise in die Tsanchabschlucht (Deutsch-Südwestafrika). Von Dr. Ed. Fleck. *With Map.*

Together with observations on the map by Herr Paul Langhans.

Madagascar. **Grandidier.**

Histoire de la fondation du Royaume Betsimisaraka. Par M. Guillaume Grandidier. Extrait du Bulletin du Comité de Madagascar, Juin 1898. Paris: A. Challamel. Size 10 × 6½, pp. 14. *Presented by the Author.*

This paper is derived, the author states, from a manuscript in the British Museum, written by de Froberville from the narrative of Mayeur, who lived in Madagascar from 1758 to 1787. It relates how Ratsimilaho, the son of an English pirate and a Malagasy princess, began an inter-tribal war which led to the formation of the Betsimisaraka, or "Inseparables."

Madagascar. *Scottish G. Mag.* **16** (1900): 1–17, 68–82. **Oliver.**

The Land of Parrots. By Captain Pasfield Oliver. *With Maps.*

Mauritius—Seychelles. **Brown.**

Seychelles. Report for 1898. Colonial Reports, Annual No. 285, 1900. Size 10 × 6, pp. 16. *Price* 1*d.*

Natal. ———

Correspondence relating to the Defence of Natal. London: Eyre & Spottiswoode, 1900. Size 13½ × 8½ pp. iv. and 26. *Price* 3*d.*

Nigeria. ———

Royal Niger Company. 1. Copy "of Letter from the Foreign Office to the Treasury, dated June 15, 1899, with respect to the revocation of the Charter of the Royal Niger Company, and to the taking over by Her Majesty's Government of the Administrative Rights and Powers of the Company, together with Copies of the Treasury Minute on the subject, dated June 30, 1899, and relative Schedules." 2. "Notes on the Niger District and Niger Coast Protectorates, 1882–93; Notification, British Protectorate over Niger Districts, June 5, 1885; Royal Charter, 'National African Company,' July 10, 1886; Notification, British Protectorate over Niger Districts, 'National African Company,' now called 'Royal Niger Company,' October 18, 1887; List of Treaties, National African Company and Royal Niger Company with Native Chiefs, 1884-92; Notification, 'Oil Rivers Protectorate to be called the Niger Coast Protectorate,' May 13, 1893." 3. "Balance Sheets of the Royal Niger Company for each Year from 1887 to 1898, inclusive." And 4. "Statements of Revenue and Expenditure of Niger Government from 1887 to 1898, inclusive." London: Eyre & Spottiswoode, 1899. Size 13½ × 8½, pp. 60. *Price* 6*d.*

Nigeria. **Robinson.**

Nigeria, our Latest Protectorate. By Charles Henry Robinson, M.A. London: H. Marshall & Son, 1900. Size 8 × 5½, pp. xii. and 224. *Map and Illustrations. Price* 5*s. net. Presented by the Publishers.*

A popular sketch of the Hausa people, life in Nigeria, the Royal Niger Company, the cause of African fever, and other matters connected with the country.

Rhodesia. *Scottish G. Mag.* **16** (1900): 92–105.

Rhodesia. *With Maps and Illustrations.*

This is a review of the last report of the South African Company, and of parts of Mr. Bryce's 'Impressions of South Africa,' with additional material from other sources.

Somaliland. **Peel.**

Somaliland. Being an Account of Two Expeditions into the Far Interior, together with a complete list of every animal and bird known to inhabit that country, and a list of the reptiles collected by the author. By C. V. A. Peel. London: F. E. Robinson & Co., 1900. Size 10½ × 6¼, pp. xvi. and 346. *Map and Illustrations. Price* 18*s. net. Presented by the Publishers.*

The narrative is that of sporting adventures, but interspersed with many acute remarks on the general natural history of the country traversed during the expedition, and there is a comprehensive list of the animals of the whole region.

South Africa. **Bertrand.**

En Afrique avec le Missionnaire Coillard. A travers l'État Libre d'Orange, le Pays des Ba-Souto, Boulouwayo. Départ de M. Coillard pour le Pays des Ba-Rotsi. Mon retour par la côte orientale: Matébéléland, Mashonaland. Territoire de la Cie de Mozambique, Beira.—Diégo-Suarez au N.-E. de Madagascar. Par Alfred Bertrand. Genève: Ch. Eggimann & Cie., [1899]. Size 8 × 6, pp. 204. *Map and Illustrations. Presented by the Author.*

Narrative of a journey to the Barotse country in 1895–96, and of a visit to Basutoland and Rhodesia in 1898–99.

South Africa. **Keane.**

The Boer States, Land and People. By A. H. Keane. London: Methuen & Co., 1900. Size 8 × 5¼, pp. xx. and 314. *Map. Price* 6*s. Presented by the Publishers.*

This is a useful book on account both of its subject-matter and its standpoint. It gives a concise and accurate account of the geography and ethnography of the Boer states, treating the history of the countries and the character of the people in an impartial manner. A minor feature of great interest is a short vocabulary of South African words now in common use, stating their meaning and origin.

Transvaal. **Olds.**

The Witwatersrand Gold-Fields. A paper read before the South Staffordshire and East Worcestershire Institute of Mining Engineers. By Francis Olds. Annual General Meeting at Birmingham, October 9, 1899. Excerpt from the Transactions of the Institution of Mining Engineers. London and Newcastle-upon-Tyne: A. Reid & Co., 1899. Size 10 × 6½, pp. 22. *Presented by the Secretary of the Institution.*

Transvaal—Zoutpansberg. **Steuart.**

The Mineral Wealth of Zoutpansberg: the Murchison Range Gold-Belt. By Douglas S. S. Steuart. Excerpt from the Transactions of the Institution of Mining Engineers. London and Newcastle-upon-Tyne: A. Reid & Co., 1899. Size 10 × 6, pp. 42. *Maps and Illustrations. Presented by the Secretary of the Institution.*

Uganda. **Thruston.**

African Incidents. Personal experiences in Egypt and Unyoro. By Brevet-Major A. B. Thruston. With an Introduction by General Sir Archibald Hunter, K.C.B., D.S.O. A Memoir of the Author by his brother, E. H. Thruston, and an Account of Major Thruston's last stay in 1897 in the Protectorate, his death, and the Mutiny of the Uganda Rifles. London: John Murray, 1900. Size 8½ × 5, pp. 332. *Portrait, Maps, and Illustrations. Price* 14*s. Presented by the Publisher.*

The late Major Thruston wrote an account of his experiences in Egypt and Uganda, of the many journeys he took in Unyoro, and of the expedition to Dongola. "All that I have written has happened," he says in the preface, "and all that has happened I have written."

West Africa.

Africa Pilot. Part i., or Sailing Directions for the West Coast of Africa, from Cape Spartel to the River Cameroon, also the Azores, Madeira, Canary, and Cape Verde Islands. Sixth Edition, 1899. London: J. D. Potter, 1899. Size 9½ × 6, pp. xxii. and 596. *Index Charts. Price* 4*s. Presented by the Hydrographer, Admiralty.*

West Africa—Benue. **Moseley.**

Regions of the Benue. By Lieh H. Moseley. [From the *Geographical Journal* for December, 1899.] Size 10 × 6¼, pp. 8. *Map.*

NORTH AMERICA.

Alaska. *B.G.S. Philadelphia* **2** (1900): 108–114. **Davidson.**

The Lynn Canal and Taiyá Inlet, Alaska. By Prof. George Davidson. *With Illustration.*

British America. **Various Authors.**

British America. With Two Maps. (British Empire Series. III.) London: Paul & Co., 1900. Size 8¼ × 5¼, pp. x. and 546. *Price 6s. Presented by the Publishers.*

Although the maps are not up to date, this volume contains a number of able papers on the Dominion of Canada, on its various provinces, and on the West Indies and British Guiana. Most of the articles were originally given in the form of lectures at the South Place Institute, Finsbury.

Canada—Geological Survey. ——

Geological Survey of Canada. Annual Report (New Series), volume x. Reports A, H, I, J, M, S. 1897. Ottawa, 1899. Size 10 × 7, pp. xii., 156, 66, 302, 160, 128, 232, and xxii. *Maps and Illustrations. Presented by the Geological Survey of Canada.*

This gives a full account of the activity of the Canadian Geological Survey for 1897, with official statistics of mineral production, many maps and illustrations, and several memoirs on special regions.

North America—Historical. **Friederici.**

Indianer und Anglo-Amerikaner. Ein geschichtlicher Ueberblick. Von Georg Friederici. Braunschweig: F. Vieweg und Sohn, 1900. Size 7½ × 5¼, pp. 148. *Presented by the Publishers.*

The author gives an account of the treatment of the native Indians in the United States and Canada, which is not pleasant reading. The facts which are stated are authenticated by references to historical works; but these facts deal only with one side of the question.

North America—Mound-Builders. **Campbell.**

P. and T.R.S. Canada **4** (1898) (Sec. 2): 3–22.

Recently Discovered Relics of the American Mound-Builders. By John Campbell, LL.D. *With Illustrations.*

United States—Chesapeake and Ohio Canal. **Ward.**

Johns Hopkins University Studies. Series xvii., Nos. 9, 10, 11. The Early Development of the Chesapeake and Ohio Canal Project. By George Washington Ward, PH.D. Baltimore, 1899. Size 9½ × 6, pp. 114.

United States—Geological Survey. ——

Nineteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1897–98. In six Parts. Part i.—Director's Report, including Triangulation and Spirit Leveling (pp. 422): Part ii.—Papers chiefly of a Theoretic Nature (pp. 958); Part iv.—Hydrography (pp. viii. and 814); Part vi. (in 2 vols.)—Mineral Resources of the United States, 1897 (pp. (1st part) viii. and 652; (2nd part) viii. and 706). Washington, 1898–99. Size 12 × 8. *Maps and Plates.*

Twentieth Annual ditto, 1898–99. In Seven Parts. Part vi. (2 vols.)—Mineral Resources of the United States, 1898. Washington, 1899. Size 12 × 8, pp. (i.) viii. and 616; (ii.) x. and 804. *Plate. Presented by the Survey.*

United States—Maryland. ——

Maryland Geological Survey. Volume Three. Baltimore: The Johns Hopkins Press, 1899. Size 10½ × 7½, pp. 462 and 80. *Maps and Illustrations. Presented by the Maryland Geological Survey.*

This report deals with the relation of geology to road-construction, and gives a complete history of the high-roads of Maryland, with maps of the existing roads, a full account of the road-making materials of the State, and various articles on subjects connected with road-making in general.

United States—Maryland. ——

Maryland Weather Service. Volume i. Baltimore: The Johns Hopkins Press, 1899. Size 10½ × 7, pp. 566. *Maps, Charts, and Illustrations.*

The lines of investigation pursued by the "Weather Service" of Maryland are very comprehensive, including Topography, Physiography, Meteorology, Hydrography, Medical Climatology, Agricultural soils, Forestry, Crop conditions, Fauna

and Flora. This volume contains a long account of "The Physiography of Maryland," and several articles on meteorology and climatology considered theoretically and in relation to Maryland.

United States—Massachusetts. ——

The Annual Statistics of Manufactures. 1898. Thirteenth Report. Boston, 1899. Size 9½ × 6, pp. xxviii. and 312. *Presented by the Bureau of Statistics of Labour, Mass.*

United States—Massachusetts. ——.

Twenty-ninth Annual Report of the Bureau of Statistics of Labour. March, 1899. Boston, 1899. Size 9 × 6, pp. xxviii. and 660. *Presented by the Bureau of Statistics of Labour, Mass.*

United States—Massachusetts. **Horsford.**

Vinland and its Ruins. Some of the Evidences that Northmen were in Massachusetts in Pre-Columbian Days. By Cornelia Horsford. [Reprinted from *Appleton's Popular Science Monthly* for December, 1899.] Size 9½ × 6½, pp. 18. *Illustrations. Presented by the Author.*

United States—Taxation. **Hollander.**

Johns Hopkins University Studies. Series xviii. Nos. 1, 2, 3, 4. Studies in State Taxation, with particular reference to the Southern States. By Graduates and Students of the Johns Hopkin's University. Edited by J. H. Hollander, PH.D. Baltimore, 1900. Size 9½ × 6, pp. 254.

CENTRAL AND SOUTH AMERICA.

Bahamas. *J.R. Colonial I.* **31** (1900): 338–352. **Robinson.**

The Bahamas. By Sir William Robinson.

Sir Wm. Robinson spent six years as Governor of the Bahamas.

British Guiana. **Edmundson.**

The Swedish Legend in British Guiana. An historical investigation by the Rev. George Edmundson. Size 13½ × 9. *Presented by E. F. im Thurn, Esq.*

British Guiana—Boundary. ——

British Guiana Boundary. Arbitration with the United States of Venezuela. Appendix to the case on behalf of the Government of Her Britannic Majesty. Vols. i.–iv., 1593–1814, and vii. (pp. vol. i., xii. and 254; vol. ii., xvi. and 228; vol. iii., vi. and 184; vol. iv., xii. and 220; vol. v., x. and 232; vol. vii., 380).—The Counter-case (pp. 142); Appendix to ditto (pp. x. and 410).—The Argument (pp. 56). London: Printed at the Foreign Office, 1898. Size 13½ × 8½.

Venezuela—British Guiana Boundary Arbitration. The case of the United States of Venezuela before the Tribunal of Arbitration to convene at Paris under the Provisions of the Treaty between the United States of Venezuela and Her Britannic Majesty signed at Washington, February 2, 1897. 3 vols. (pp. vol. i., 236; vol. ii., Appendix, Parts 1 and 2, xxvi. and 488; vol. iii., Appendix, Parts 3, 4, 5, 6, 7, and 8, xviii. and 426).—The Counter-case of the United States of Venezuela. 3 vols. (pp. vol. i., 118; vol. ii., Appendix, Part 1, 312; vol. iii., Appendix, Parts 2, 3, 4, 5, 6, and 7, xiv. and 459).—The Printed Argument on behalf of the United States of Venezuela. 2 vols. (pp. 766 and lxxx.). New York, 1898. Size 10 × 7. *Presented by E. F. im Thurn, Esq.*

These volumes practically complete the Society's collection of the literature of the arbitration on the boundary between British Guiana and Venezuela, which forms a unique epitome of the geography and political history of an extensive region.

British Guiana and Venezuela. **Im Thurn.**

An Alphabetical List of Place-Names occurring in the British Case against Venezuela. [By E. im Thurn.] Size 13½ × 8½, pp. 60. *Presented by the Author.*

Brazil. *Verh. Ges. Erdk. Berlin* **27** (1900): 112–128. **Meyer.**

Herr Dr. Herrmann Meyer: Bericht über seine zweite Xingú-Expedition. *With Map.*

A journey in 1898–99 into Matto Grosso from the Argentine Republic.

Chile. ——

Sinopsis estadistica i jeografica de la Republica de Chilo en 1897. Santiago, 1898. Size 10 × 7, pp. 296.

Chile—Auca language. *Verh. Deutsch. W. V. Santiago de Chile* 4 (1899): 1-53. **Lenz.**

Kritik der Langue Auca des Herrn Raoul de la Grasserie. Von Rudolf Lenz.

Chile—Rainfall. *Verh. Deutsch. W. V. Santiago de Chile* 4 (1899): 63-74. **Martin.**

Der Regen in Südchile. Von Dr. K. Martin.

General account of the character of the rainfall in Southern Chile, with tables of rainfall and number of rainy days at Puerto Montt for each month from January, 1888, to March, 1899. The average annual rainfall was 78 inches, with a maximum of 10·94 inches in July, and a minimum of 4·28 inches in February. The average number of rainy days in the year was 195, with a maximum of 20 days in July and August, and a minimum of 11 days in February.

Chile—Swamps. *Verh. Deutsch. W. V. Santiago de Chile* 4 (1899): 55-62. **Martin.**

Sümpfe und ñadis. Von Dr. K. Martin.

The name "ñadi" is applied to a class of swamps common in Chile, which are composed of the roots of the ñadi plant. This plant is not certainly identified, but may be the *Dichromena atrosanguine.*

Chile and Argentine. *Petermanns M.* 45 (1899): 285-288. **Polakowsky.**

Die von Chile und Argentinien beanspruchten Grenzlinien. Von Dr. H. Polakowsky.

Colombia. **Regel.**

Kolumbien, von Professor Dr. Fritz Regel. (Bibliothek der Länderkunde, herausgegeben von Prof. Dr. Alfred Kirchhoff und Dr. Rudolf Fitzner, Siebenter und achter Band.) Berlin: A. Schall, [1899]. Size 10½ × 7, pp. xii. and 274. *Maps and Illustrations. Price* 10*m.*

A complete and richly illustrated geographical account of the republic of Colombia, partly based on the author's travels in that country, partly compiled from a carefully selected collection of the works of previous travellers.

Colombia and Costa Rica. **Silvela.**

Limites entre la Colombie et le Costa-Rica, Exposé présenté à son Excellence M. le Président de la République Française en qualité d'Arbitre. Par Don Francisco Silvela. Madrid, 1898. Size 11¼ × 7½, pp. 74.

Différend entre la Colombie et le Costa-Rica, Arbitrage de son Excellence M. le Président de la République Française. Deuxième Mémoire présenté au nom de la République de Colombie. Paris, 1899. Size 11½ × 7½, pp. 106.

Official documents regarding the arbitration as to the boundary between Colombia and Costa Rica, which for practical purposes is the boundary between South and Central America.

Costa Rica. *Globus* 77 (1900): 1-8, 28-31. **Sapper.**

Ein Besuch bei den Chirripó- und Talamanca-Indianern von Costarica. Von K. Sapper. *With Illustrations.*

Jamaica. **Hemming.**

Jamaica. Report for 1898-9. Colonial Reports, Annual No. 283, 1899. Size 9½ × 6½, pp. 76. *Price* 4*d.*

Nicaragua. **Niederlein.**

The State of Nicaragua of the Greater Republic of Central America. By Gustavo Niederlein. The Philadelphia Commercial Museum. Philadelphia, 1898. Size 9½ × 6, pp. 94.

Patagonia. **Fonck.**

Viajes de Fray Francisco Menendez a Nahuelhuapi. Publicados i comentados por Francisco Fonck. Valparaiso: Carlos F. Niemeyer, 1900. Size 10 × 7, pp. xx. and 528. *Map and Illustration. Presented by the Author.*

The narrative of the four journeys of Menendez to Lake Nahuel-huapi between 1791 and 1794, with a historical introduction, and supplementary matter treating of the more recent explorations and maps of the district, and of the question of the boundary-line between Chile and the Argentine Republic.

Peru. *B.S.G. Lima* 9 (1899): 1-14. **Balta.**

Labor de Raimondi. Por José Balta.

Peru. *B.S.G. Lima* 9 (1899): 123-124. **Haenke.**

Descripción y análisis de las aguas de Yura. Por Tadeo Haenke.

Peru. *B.S.G. Lima* 8 (1899): 361-387. **Raimondi.**

Itinerario de los viajes de Raimondi en el Perú: Cuzco, Quispicanchi, Lucre, Pisac, etc., y regreso hasta Albancay (1865).

Peru. *B.S.G. Lima* 8 (1899): 417-450. **Robledo.**

La hoya del Urubamba. Por el Sr. Luis M. Robledo. *With Map.*

The paper has the title "La via fluvial del Urubamba" in the text, and deals with the upper part of the river Urubamba as a traffic route.

San Salvador. **Juárez.**

Estudio sobre San Salvador desde el punto de vista médico . . . por Isidro B. Juárez. San Salvador, 1899. Size 9½ × 6½, pp. 20. *Presented by the Author.*

On San Salvador from a medical point of view.

AUSTRALASIA AND PACIFIC ISLANDS.

Australia. *G.Z.* 6 (1900): 199-209. **Jung.**

Die Wasserversorgung des Australkontinents. Von Dr. Emil Jung.

Discusses the systems of irrigation practised in Australia.

British New Guinea. ———

Queensland. Annual Report on British New Guinea from 1st July, 1898, to 30th June, 1899; with Appendices. Brisbane, 1900. Size 13½ × 8½, pp. xxxiv. and 116. *Maps.*

Easter Island. **Cooke.**

Rep. Smithsonian I. (1897), *U.S. National Museum* 1 (1899): 689-723.

Te Pito Te Henua, known as Rapa Nui; commonly called Easter Island, South Pacific Ocean. By George H. Cooke.

This report is based on a visit of the U.S.S. *Mohican* to Easter Island for twelve days in December, 1886.

Fiji. *T.R.G.S. Australasia* (*Victoria*) 17 (1899): 40-51. **Thomson.**

Fiji: Past and Present. By Captain Wm. Campbell Thomson. *With Illustrations.*

Captain Thomson contrasts two visits paid to the Fiji islands at an interval of twenty-three years.

New Zealand. *T. and P. New Zealand I.* (1898) 31 (1899): 590-593. **Hogben.**

Notes on the Comparison of some Elements of Earthquake Motion as observed in New Zealand, with their Theoretic Values. By George Hogben, M.A.

New Zealand. *T. and P. New Zealand I.* (1898) 31 (1899): 583-590. **Hogben.**

The Wanganui Earthquake of the 8th December, 1897. By George Hogben, M.A.

New Zealand. *T. and P. New Zealand I.* (1898) 31 (1899): 471-482. **Walsh.**

On the Future of the New Zealand Bush. By Canon Philip Walsh.

On the change in the character of the New Zealand bush in the past, and its probable farther change in the future.

New Zealand—Taupo District. **Friedlaender.**

T. and P. New Zealand I. (1898) 31 (1899): 498-510.

Some Notes on the Volcanoes of the Taupo District. By Benedict Friedlaender, PH.D.

Pacific—Volcanoes. *T. and P. New Zealand I.* (1898) 31 (1899): 510-551. **Phillips.**

The volcanoes of the Pacific. By Coleman Phillips. *With Plate.*

Pacific Islands. *Abh. G. Ges. Wien* 1 (1899): 373-438. **Mauler and Kesslitz.**

Die Missions-Reise S.M. Schiff *Albatros*, 1895-1898. Von J. von Mauler und Wilhelm Kesslitz. *With Map and Plate.*

The cruise of the *Albatros* was the occasion of making a series of observations on oceanic conditions, and on the climate of the Melanesian islands.

Queensland. ———

Greater Britain Exhibition, Earl's Court, London, 1899. Catalogue of Exhibits in the Queensland Court. Size 8½ × 5½, pp. 94.

Queensland. ———

Information relating to Queensland and its Resources. Also a complete list of towns in the Colony, with descriptive particulars thereof. Issued *Gratis* by the

Agent-General for Queensland. Reprinted from the 'Australian Handbook' for 1899, published by Messrs. Gordon & Gotch, London. Size 10 × 6½, pp. 62. *Maps.*

Queensland. **Evans.**

"The Garden of Queensland" (Darling Downs). Compiled and Edited by Essex Evans. Illustrated by James Bain. Toowoomba, Queensland: J. H. Robertson & Co., 1899. Size 6 × 10, pp. 94. *Maps and Illustrations. Presented by the Agent-General for Queensland.*

Queensland—Rockhampton.

On the Tropic Line. Rockhampton. Central Queensland's chief City. The Commercial Capital of a Rich District. Its History, Surrouudings, and Resources. By J. T. M. The Queenslander, Brisbane, August 5, 1899, pp. 269–284. *Illustrations.* Size 18 × 12.

Tasmania. *J.R. Colonial I.* **31** (1900): 153–179. **Fysh.**

Tasmania: Primitive, Present, and Future. By the Hon. Sir Philip O. Fysh, K.C.M.G.

Tasmania. *T. and P. New Zealand I.* (1898) **31** (1899): 594–601. **Hogben.**

The Tasmanian Earthquake of the 27th January, 1892. By George Hogben.

Western Australia.

Western Australia. Report of the Department of Mines for the year 1898. Perth, 1899. Size 13½ × 8½, pp. xciv. and 126. *Maps.*

Western Australia. *R.G.S. Australasia Victoria* **17** (1899): 64–72. **Russel.**

Expedition to the Barrow, Cavenagh, and Warburton Ranges, Western Australia. By Hugh Russel. *With Map.*

A journey of 350 miles from west to east, undertaken in 1897.

POLAR REGIONS.

Arctic—Andrée's Expedition. *Ymer* **19** (1899): 333–335. **Svedenborg.**

Om den på Island funna flytbojen från Andrée-expeditionen. Af G. V. E. Svedenborg. *With Map and Illustration.*

On the buoy found in Iceland which was thrown out of his balloon by Andrée on July 11, 1897, in lat. 82° and long. 25° E. The last words before the signatures are in English, "All right," but the word "well" has been written over "right" on second thought.

Arctic—New Siberian Islands. **Toll.**

Mém. A. Imp. Sci. St.-Pétersbourg **9** (1) (1899): 1–20.

Geological Report on the New Siberian Islands. By Baron E. Toll. [In Russian.] *With Maps. Presented by the Author.*

Arctic—Norwegian Expedition. **Nansen.**

The Norwegian North Polar Expedition, 1893–1896. Scientific Results, edited by Fridtjof Nansen. Volume i. London, etc.: Longmans & Co., 1900. Size 12 × 9½, pp. viii., 16, 147, 26, 53, and 137. *Plates. Presented by Dr. Nansen. A second copy presented by the Publishers.*

The scientific results of the *Fram*, of which this is the first volume, are being published in the English language only, and the accuracy of the printing is a matter on which the Christiania printers deserve to be congratulated. This volume contains a short article by Colin Archer on the *Fram*, giving a full account of the plan of the ship, with working drawings. J. F. Pompeckj and F. Nansen discuss the geology and the Jurassic fauna of Cape Flora, Franz Josef Land; A. G. Nathorst describes the fossil plants from Franz Josef Land; R. Collett and F. Nansen describe the birds collected on the voyage of the *Fram*; and G. O. Sars deals with the crustacea in great detail.

Greenland. *G. Tidskrift* **15** (1899): 53–71. **Amdrup, Kruuse, Poulsen.**

Den østgrønlandske Expedition, 1898-99. Ved G. Amdrup, C. Kruuse, Knud Poulsen. *With Map.*

This expedition is referred to in the *Journal*, vol. xiv. (1899) p. 449.

Greenland. *National G. Mag.* **11** (1900): 118–122. **Merrill.**

A Hunting Trip to Northern Greenland. By Fullerton Merrill.

The trip was undertaken on the Peary supply steamer *Diana* in the summer of 1899.

Greenland Seas. **Garde.**

The State of the Ice in the Waters East and West of Greenland, 1899. By V. Garde. Special print of the nautical-meteorological annual of the Danish Meteorological Institute. [In Danish and English.] Size 12 × 9½, pp. xvi. *Maps.*

Contains maps of the distribution of ice in the sea around Greenland in the respective months March, April, May, June, July, and August, 1899.

Polar Climates. *Meteorolog. Z.* **17** (1900): 75–79. **Woeikof.**

Arktis und Antarktis. Von A. Woeikof.

On the climate of the arctic and antarctic regions.

Spitsbergen. *C. Rd.* **130** (1900): 304–306. **Monaco.**

Sur la deuxième campagne de la *Princesse-Alice IIe.* Note de S. A. S. le Prince Albert Ier de Monaco.

The principal work of this expedition in the summer of 1899 was the exploration of Red bay and other parts of northern Spitsbergen, which were sounded and surveyed.

MATHEMATICAL GEOGRAPHY.

Astronomy. **Gall.**

An Easy Guide to the Constellations, with a Miniature Atlas of the Stars. By the Rev. James Gall. New and Enlarged Edition. London: Gall & Inglis, 1900. Size 5½ × 4½, pp. 62. *Price* 1*s. Presented by the Publishers.*

Navigation. *Ann. Hydrographie* **28** (1900): 21–24. **Shrader.**

Die Beschickung von Lothungen auf Niedrigwasser. Von Dr. C. Schrader.

Method and tables for facilitating the comparison of soundings with figures on a chart by calculating the low-water depth of soundings taken at any time when the hour of high water and the total rise of the tide are known.

Navigation—Position. *Ann. Hydrographie* **28** (1900): 29–31. **Bolte.**

Zur Berechnung des Schiffsortes aus zwei Gestirnshöhen nach der Höhenmethode. Von Dr. Bolte.

Time. *T. and P. New Zealand J.* (1898) **31** (1899): 577–583. **Hudson.**

On Seasonal Time. By G. V. Hudson.

A proposal to utilize the long days of summer by calling midnight 2 a.m., and to utilize the short days of winter by calling 2 a.m. midnight.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geology. **Lapparent.**

Traité de Géologie. Par A. de Lapparent. Quatrième édition. Fasc. iii. Géologie proprement dite. Paris: Masson et Cie, 1900. Size 10 × 6½, pp. 1241–1912. *Maps and Illustrations. Presented by the Publishers.*

This completes the new edition of Prof. de Lapparent's great treatise on geology, the earlier part of which was noticed in the *Journal* for March, p. 287.

Glaciers. **Danneberg.**

Ueber die festen Aggregatzustände des Wassers unter besonderer Berücksichtigung der Gletschertheorie. Inaugural-Dissertation zur Erlangung der Doktorwürde der Hohen Philosophischen Fakultät der Universität Leipzig vorgelegt von Rudolf Danneberg. Zwickau: R. Zückler, 1899. Size 9 × 6, pp. 56. *Presented by Prof. Ratzel.*

On the plasticity of glacier ice, considered in the historical development of the researches and theories upon the subject, with a supplement on the origin of the glacier ice from snow, névé, and ordinary ice. The memoir was published in the *Jahresbericht* of the Verein für Naturkunde of Zwickau for 1899.

Kymatology. *Z. Ges. Erdk. Berlin* **34** (1899): 408–424. **Baschin.**

Die Entstehung wellenähnlicher Oberflächenformen. Ein Beitrag zur Kymatologie. Von Otto Baschin. *Also a separate copy, presented by the Author.*

Herr Baschin treats of wave-forms in water and air, of ripple-marks and dunes, and contests some of the views upheld by Mr. Vaughan Cornish on these matters.

Lake Life. *Science* **11** (1900): 374–389. **Marsh.**

The Plankton of Fresh-water Lakes. By C. Dwight Marsh.

Mountain-building. *C. Rd.* **130** (1900): 291–298. **Bertrand.**

Essai d'une théorie mécanique de la formation des montagnes. Déplacement progressif de l'axe terrestre. Note de M. Marcel Bertrand.

Oceanography. *Ymer* **19** (1899): 341–352. **Pettersson.**

Om systematisk hydrografisk och biologisk undersökning af Europas haf, innanhaf och djupa sjöar. Af Otto Pettersson. *With Maps.*

On oceanographical and limnological desiderata in connection with the proposed systematic study of the seas bordering Northern Europe.

Oceanography—Apparatus. *Atti R.A. Lincei, Rendiconti* **9** (1900): 9–12. **Guglielmo.**

Intorno ad alcuni modi per correggere e per evitare l'errore di capillarità negli areometri a peso costante e a volume costante ed intorno ad alcune nuove form dei medesimi. Nota II. di G. Guglielmo.

Oceanography—Apparatus. *Atti R.A. Lincei, Rendiconti* **9** (1900): 33–41. **Guglielmo.**

Intorno ad alcuni nuovi areometri ad immersione totale, ad inclinazione variabile e a riflessione. Nota I. di G. Guglielmo.

On new total-immersion hydrometers.

Oceanography—North Sea. **Phaff.**

Institut Météorologique Royal Néerlandais. Étude sur les courants de la Mer du Nord. Noord-Hinder. Par J. M. Phaff. La Haye: Monton & Cie. Size 13½ × 10, pp. 58. *Plates. Presented by the Institut Royal Météorologique des Pays-Bas.*

Lieut. Phaff has been engaged for several years in the study of the currents on the coast of Holland, near the north Hinder, and here presents the data in full, with diagrams illustrating the direction and velocity of the current at each hour of the lunar day.

Plant-geography. **Goebel.**

Ueber Studium und Auffassung der Anpassungserscheinungen bei Pflanzen. Festrede gehalten in der öffentlichen Sitzung der k. b. Akademie der Wissenschaften zu München zur Feier ihres 139. Stiftungstages am 15 März 1898. Von Karl Goebel. München, 1898. Size 11 × 9, pp. 24. *Presented by the k. b. Akademie der Wissenschaften, München.*

On the adaptation of plants to their environment.

Spherical deformations. *B.A.R. Belgique* **35** (1898): 270–286. **Schoentjes.**

Sur les déformations que fait naître la pression dans un hémisphère creux métallique. Par H. Schoentjes. *With Diagram and Illustrations.*

On the nature of the deformations produced by pressure on the surface of a hollow hemisphere of brass. The manner of yielding of the spherical shell is of interest from its bearing on the deformations of the crust of the Earth.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Commercial Geography. **Harper.**

Mulhall-Harper Comparative Statistical Tables and Charts of the Commerce of the World. Compiled by William Harper. Philadelphia: Commercial Museum, 1899. Size 9 × 6, pp. 94. *Presented by the Philadelphia Commercial Museum.*

A series of statistical diagrams showing by coloured rectangles and sectors of circles the share taken in trade by the chief nations of the world grouped according to various divisions.

Commercial Geography—Sea Trade. ——

Merchant Marine of Foreign Countries. Special Consular Reports. Vol. xviii. Washington, 1900. Size 9 × 6, pp. xvi. and 182.

A collection of consular reports on the shipping of different countries, with statistics, but without any general discussion.

Commercial Geography—Tariffs. ——

Tariffs of Foreign Countries. Special Consular Reports. Vol. xvi. Part 1. Europe. Part 2. America. Washington, 1899. Size 9 × 6, pp. (part 1) 776, (part 2) 1304.

Historical. **Beazley.**

New Light on some Mediæval Maps. By C. Raymond Beazley, M.A. [From the *Geographical Journal* for December, 1899.] Size 10 × 6½, pp. 10.

Historical Maps. **Christy.**

The Silver Map of the World. A Contemporary Medallion commemorative of Drake's great Voyage (1577–80). A Geographical Essay. Including some Critical Remarks on the Zeno Narrative and Chart of 1558, and on the Curious Misconception as to the position of the Discoveries made by Martin Frobisher in 1576–7-8 which crept into the Cartography of the North Atlantic and of the North-Eastern Coast of America through the Errors of the Zeno Chart. By Miller Christy. Illustrated by facsimile reproductions of the Silver Map and seven other contemporary Charts referred to and by two diagrammatic Charts. London: H. Stevens, Son, & Stiles, 1900. Size 9 × 5½, pp. xii. and 72. *Price* 12*s.* 6*d. net. Presented by the Author and Publisher.*

This interesting sketch contains reproductions of the contemporary silver medallion commemorating Drake's voyage, and also of a number of old charts.

Historical—North Pacific. **Nachod.**

M. Deutsch. Ges. Natur- u. Völkerk. Ostasiens, Tokyo 7 (1899): 311–451.

Ein unentdecktes Goldland. Ein Beitrag zur Geschichte der Entdeckungen im nördlichen Grossen Ocean. Von Dr. O. Nachod.

Notes on the legend of an island rich in gold and silver lying to the east of Japan, and particulars of the voyages made in search of it by Portuguese, Spanish, Dutch, English, and Russian vessels.

History of Geography. **Nyström.**

Geografiens och de geografiska upptäckternas historia till början af 1800-talet. Af Dr. J. F. Nyström. Stockholm: C. E. Fritzes, 1899. Size 10 × 7, pp. viii. and 414. *Maps, etc. Price* 8.25*kr.*

Deals with the history of exploration and the development of geographical science in fine historical periods—Ancient, Early Mediæval (A.D. 400–1240), Later Mediæval (1250–1492), Maritime Discoveries (1492-1600), and Seventeenth and Eighteenth Centuries (1600–1800).

Rivers as Boundaries. **Junghans.**

Der Fluss in seiner Bedeutung als Grenze zwischen Kultur- und Natur- Völkern. Inaugural-Dissertation zur Erlangung der Doktorwürde der philosophischen Fakultät der Universität Leipzig vorgelegt von osk. Emil Junghans. Leipzig-Plagwitz: Emil Stephan, 1899. Size 9 × 5½, pp. vi. and 76. *Presented by Prof. Ratzel.*

This is referred to in the *Journal* for May, p. 541.

BIOGRAPHY.

Lichtenberg. *Abh. G. Ges. Wien.* 1 (1899): 119–135. **Günther.**

G. C. Lichtenberg und die Geophysik. Von Dr. Siegmund Günther.

Georg Christoph Lichtenberg was born at Oberramstadt, near Darmstadt, in 1744 or 1742, was professor of Nature Study (*Naturlehre*) in the University of Göttingen, and died in 1799. He made some important studies in physical geography.

Lothian. *Scottish G. Mag.* 16 (1900): 57–58. ———

The Late Marquess of Lothian, P.C., K.T., LL.D. *With Portrait.*

Mitchell. **Mitchell.**

In Western India, Recollections of my early Missionary Life. By the Rev. J. Murray Mitchell, M.A., LL.D. Edinburgh: D. Douglas, 1899. Size 8 × 5½, pp. xii. and 406. *Map. Price* 5*s. Presented by the Publisher.*

These "Recollections" date from 1838 to 1863, and form a record of a life full of remarkable experiences of missionary enterprise, mainly in the west of India.

Moffat. **Moffat.**

The Lives of Robert and Mary Moffat. By their son, John Moffat. Eleventh Edition. London: T. Fisher Unwin, [1900]. Size 8 × 5½, pp. xii. and 314. *Portrait and Illustrations. Price* 6*s. Presented by the Publisher.*

A cheap edition of the life of the pioneer missionary in South Africa.

Napier of Merchiston. **Gravelaar.**

Verh. K.A. Wetens. Amsterdam 6 (1 Sec.) 1899: 1–160.

John Napier's Werken. Door N. L. W. A. Gravelaar. *With Portrait and Plates.*

A biographical account of John Napier of Merchiston, with a discussion of his system of logarithms and other mathematical works.

Radde.

Dr. G. Radde—List of Published works with Portraits. Tiflis, 1899. Size 9½ × 6½. *Presented by the Author.*

Tillo. **Artamonoff.**

Obituary Notice of General A. A. Tillo. By L. K. Artamonoff. [In Russian.] St. Petersburg, 1900. Size 10 × 6, pp. 26.

Varenius. **Schwerdfeger.**

Bernhard Varenius und die Morphologischen Capitel seiner "Geographia Generalis" (Amsterdam, 1650). Ein Beitrag zur Geschichte der Geographie von Dr. Josef Schwerdfeger. (Separatabdruck aus dem Jahresberichte des K. K. Staatsgymnasiums in Troppan. 1897–8, 1898–9.) Size 10 × 6½, pp. 48. *Presented by the Author.*

On the life and work of the father of modern physical geography.

GENERAL.

Bibliography.

Catalogue of Books in the Library of the Alpine Club. Edinburgh: T. & A. Constable, 1899. Size 9 × 6, pp. 224. *Presented by the Alpine Club.*

This catalogue is arranged under authors' names in the first part, and according to subjects (alphabetically arranged) in the second.

British Empire.

Statistical Abstract for the several Colonial and other possessions of the United Kingdom, in each year from 1884 to 1898. London: Eyre & Spottiswoode, 1899. Size 10 × 6½, pp. 306. *Price* 1*s.* 3*d.*

Educational—Instrument. *J. School G.* **4** (1900): 10–20. **Surface.**

The Helior: an Instrument for Observational Work in Mathematical Geography. By H. A. Surface.

Description of a rough wooden quadrant designed for school demonstrations of the altitude of the sun, and of very inexpensive construction.

Foreign Missions.

The Eighty-ninth Annual Report of the American Board of Commissioners for Foreign Missions. Presented at the meeting held at Providence, R.I., October 3–6, 1899. Boston: Published by the Board. Size 9½ × 6½, pp. xviii. and 198. *Maps.*

Geographical Congress. *Petermanns M.* **45** (1899): 238–240, 268–269, 288–290. **Supan.**

Der VII. Internationale Geographenkongress zu Berlin, 28 September bis 4 Oktober 1899. Von Prof. Dr. A. Supan.

German Colonies.

Kolonial-Handels-Adressbuch 1900. (4 Jahrgang.) Herausgegeben von dem Kolonial-Wirtschaftlichen Komitee. Berlin: E. S. Mittler & Sohn. Size 10½ × 7½, pp. 114. *Maps.*

This directory, in addition to the names of business firms in the various German colonies, gives a good deal of practical information about the colonies, and maps showing the various concessions.

German Naval Observatory.

Einundzwanzigster Jahresbericht über die Thätigkeit der Deutschen Seewarte für das Jahr 1898. Erstattet von der Direktion. Beiheft II. zu den "Annalen der Hydrographie und Maritimen Meteorologie," 1899. Hamburg, 1899. Size 10½ × 7½, pp. iv. and 100.

Report on the work, nautical and scientific, of the German naval observatory at Hamburg, which, under the leadership of Dr. Neumayer, produces every year much oceanographical work of scientific value to the world, as well as of practical importance to German shipmasters.

Historical Charts. *P.R. Artillery J.* **26** (1899): 467–484. **Ward.**

Synoptical Charts applied to military subjects. By Captain B. R. Ward. *With Chart.*

These charts are diagrams intended to show the chronological order of movements in the course of a campaign.

International Relations. *B.A.R. Belgique* **35** (1898): 629–728, 925–993. **Descamps.**

L'évolution de la neutralité en droit international. Par M. le chevalier Descamps.

Maps. **Mehedinți.**

Ueber die kartographische Induktion. Inaugural-Dissertation zur Erlangung der Doktorwürde bei der hohen philosophischen Fakultät der Universität Leipzig eingereicht von S. Mehedinți. Leipzig: Sellmann & Henne, 1899. Size 9 × 6, pp. 52. *Presented by Prof. Ratzel.*

On the study of maps, showing how, in the logical discussion of geographical questions, the map supplies information which no description in words can convey.

Medical Geography—Scurvy. *P.R.S.* **66** (1900): 250–265. **Jackson and Harley.**

An Experimental Inquiry into Scurvy. By Frederick G. Jackson and Vaughan Harley, M.D.

The authors produce evidence to demonstrate that the cause of scurvy is ptomaine poisoning, due to eating tainted meat. This idea, suggested by experience in the arctic regions, was tested experimentally by feeding monkeys in three groups on a diet including fresh tinned meat, slightly tainted tinned meat, and slightly tainted meat with the addition of fresh fruit. The result of the experiments confirmed the theory, and helps to prove that the use of fresh vegetables or lime-juice is not sufficient either to prevent or cure scurvy.

Melbourne Geographical Society. **Madden.**

T.R.G.S. Australasia (*Victoria*) **17** (1899): 5–29.

Inaugural Address by the President (Sir John Madden).

This address on the progress of geography, and the discussion which followed it, show that geography is being forwarded in an enlightened manner by the Royal Geographical Society of Australasia in Melbourne.

Military Geography. *Scottish G. Mag.* **16** (1900): 138–160. ——

Military Geography: a Review.

Mountaineering. *Annuaire Club Alpin Français* **25** (1898): 34–82. **Bregeault.**

Les chasseurs alpins. Par M. Julien Bregeault. *With Illustrations.*

On military mountaineering, with special reference to the French alpine regiment.

Mountaineering. **Javelle.**

Alpine Memories. By Émile Javelle. With a Biographical and Literary Notice by Eugène Rambert. Translated and with an Introduction by W. H. Chesson. London: T. Fisher Unwin, 1899. Size 8½ × 6, pp. vi. and 444. *Portraits and Illustrations. Price 7s. 6d. Presented by the Publisher.*

The late M. Javelle was an enthusiastic mountaineer, whose eloquent descriptions and profound appreciation of mountain beauty are presented with wonderful effect in the translation.

Paradox. **Unger.**

Die Ursache der Umdrehung der Erde und aller Planeten um ihre Achse. Das Wesen der Monde, der Saturn-Ringe und der Meteorsteine. Ferner drei damit zusammenhängende physikalische Probleme entdeckt, bewiesen und erläutert in drei Gesprächen mit Prof. Ed. Süss, Prof. Edm. Weiss, N. N., vom Verfasser Joachim Unger. Wien-Leipzig. Size 8½ × 5½, pp. 30. *Presented by the Author.*

This little book, which seeks to explain terrestrial rotation through the action of solar warmth on the atmosphere, is interesting in showing the extreme consideration and kindness of Austrian professors to all students however uninstructed.

Photography. *La France de Demain*, **No. 13** (1899): 47–63. **Radiot.**

Les Voyageurs et les Images. L'Illustration intensive par la Photographie repérée. Par Paul Radiot.

Scenery. *Annuaire Club Alpin Français* **25** (1898): 556–577. **Schrader.**

A quoi tient la beauté des montagnes. Par M. Franz Schrader.

Telephotography. **Dallmeyer.**

Telephotography, an Elementary Treatise on the Construction and Application of the Telephotographic Lens. By Thomas R. Dallmeyer. London: Heinemann, 1899. Size 10 × 7½, pp. xvi. and 148. *Illustrations. Price 15s. Presented by the Publisher.*

This gives full particulars of the theory of the Telephotographic lens, and instructions for its use. A number of illustrations are given showing the advantage of using these lenses in photographing distant objects. The method has already produced extremely interesting results with regard to geography.

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Bartholomew.**

Bartholomew's Cyclists' Touring Map of England and Wales, showing the best touring roads. Scale 1 : 823,680 or 13 stat. miles to an inch. J. Bartholomew & Co., Edinburgh. *Price 2s. mounted on cloth. Presented by the Publishers.*

The scale of this map, 13 stat. miles to an inch, is rather small for cycling purposes. However, the roads are clearly shown in colour, and the principal touring routes distinguished from cross-roads. The map embraces the whole of England and Wales, the Isle of Man, and the southern part of Scotland: and the elevations from sea-level to above 3000 feet are indicated by seven different tints of colour.

England and Wales. **Ordnance Survey.**

Publications issued since March 8, 1900.

1-inch—General Maps:—

ENGLAND AND WALES (revision):—99, 181, 189, 207, 209, 294, 310, 336, hills engraved in black or brown. 1*s. each.*

6-inch—County Maps:—

ENGLAND AND WALES (revision):—**Berkshire**, 31 S.E., 32 S.W. **Bucks**, 33 N.W., 34 S.W., S.E., 36 N.W., 37 N.W., N.E., S.E., 38 N.W., N.E., S.W., 40 S.E., 41 S.E., 42 S.W., 43 N.W., 46 N.E., 47 S.W., 53 N.W., N.E., S.E., 55 S.E., 56 S.W., 57 N.W. **Cheshire**, 52 N.W., 53 N.W., 57 S.E., 58 N.W., 63 N.W., S.W., 66 S.E., 67 N.W. **Denbighshire**, 22 N.E. **Derbyshire**, 4 S.W., 30 N.W., N.E., S.E., 31 N.E., S.E., 31A N.W., 31 N.W., 32 N.E., 33 N.E., S.E., 34 N.E. **Flint**, 15 S.W. **Herts**, 16 S.E. **Notts**, 13 S.E., 18 N.E., 23 N.E. **Oxfordshire**, 41 N.W., 42 N.W., 47 S.E. **Sussex**, 68 N.E., S.E. **Westmorland**, 5 N.E., S.W., 7 S.W., 25 S.W. 1*s. each.*

25-inch—Parish Maps:—

ENGLAND AND WALES (revision):—**Anglesey**, VIII. 14; XIV. 16; XV. 2, 3, 6, 9, 10. **Berkshire**, XXXIII. 14, 16; XLII. 4, 8, 12; XLIII. 2, 3, 4, 5, 6, 7, 8; XLIV. 5, 6, 12. **Buckinghamshire**, II. 11, 12, 13, 14, 16; IV. 7, 14, 15, 16; V. 1, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16; VI. 5 and 6, 9, 14; VII. 12, 15; VIII. 5, 7, 8; IX. 2, 4, 7, 8, 11, 14; X. 1, 3, 4, 5, 6, 7; XI. 5; XII. 7; XIII. 11. **Carnarvonshire**, II. 14; III. 10; IV. 4, 13; V. 1; VII. 5, 7, 8, 10, 11, 12, 15, 16; VIII. 7, 8, 11, 15; XIII. 3, 7, 8, 10, 11, 12, 14, 15; XIV. 5; XVIII. 3, 7, 8, 10, 11; XXIII. 3. **Cumberland**, XLV. 15; XLVI. 15, 16; XLIX. 3, 7, 16; L. 11, 13, 14, 15; LV. 2; LIX. 4. **Derbyshire**, XXXV. 8, 14, 15; XXXVI. 5; XXXVIII. 13, 15; XXXIX. 5, 11, 13, 15, 16; XL. 1, 2, 3, 5, 6, 9, 10. **Denbighshire**, III. 2, 6; VI. 5, 10, 13; XI. 5, 6, 7, 9, 10, 13, 14; XVI. 9, 13, 14; XXIII. 2, 6, 7, 11, 15, 16; XXX. 3, 7; XXXII. 10. **Glamorganshire**, XI. 3, 7, 10, 14; XVIII. 2; XLII. 13, 15; XLVI. 2, 11, 14; L. 10. **Northamptonshire**, XLIX. 13; LIII. 13; LIV. 1, 2, 11, 14; LVII. 7, 14; LVIII. 2, 3, 5, 6, 9, 10, 13, 14; LIX. 12, 15; LX. 5, 7, 8; LXI. 2, 6, 7, 11, 13, 14; LXIII. 7. **Nottinghamshire**, XXV. 2; XXVI. 13; XXVII. 5, 6; XXIX. 3, 6; XXX. 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 14, 16; XXXI. 2, 5, 6, 10, 13. **Oxfordshire**, I. 13; IA. 16; II. 4, 7, 8, 9, 10, 11, 12, 13, 16; III. 1, 2, 11, 13, 14; V. 1, 2, 8, 12; VI. 2, 3, 5, 6, 9, 10, 13, 14; IX. 3; XI. 7. **Staffordshire**, XI. 15; XV. 13; XVI. 16; XVII. 13, 14. **Wiltshire**, III. 13; VII. 16; VIII. 5 and 6, 9, 10, 11, 13, 16; XII. 16; XIII. 1, 2, 3, 4, 6, 7, 8, 11, 12, 13, 14; XIV. 5, 6, 7; XVIII. 12; XIX. 2, 3, 6, 10; XXIX. 3, 8; XXX. 13, 14. 3*s. each.*

ENGLAND AND WALES, 4 miles to an inch, revised and re-numbered sheets: 4, 8 (21 and 25), 22, 23. 1*s.* 6*d. each.*

Miscellaneous:—County Diagrams, scale 2 miles to 1 inch, printed in colours, showing unions, boroughs, sanitary districts, and civil parishes; also the $\frac{1}{2500}$ scale-sheet lines, viz. Denbigh, Essex, Glamorgan, Gloucester, Hampshire, Monmouth, Northampton, Stafford, Warwick, Wilts, West Riding of Yorkshire (North and South parts, 3*s. each*); also Devonshire, Norfolk, Suffolk, 3 miles to 1 inch. 3*s. each.* (*E. Stanford, Agent.*)

Italy. **Instituto Cartografico Italiano.**

Carte delle Strade Ferrate Italiane. Scale 1: 1,500,000 or 23·6 stat. miles to an inch. Roma: Instituto Cartografico Italiano, 1900. *Price 2 lire.*

This map shows the railways of Italy, and their connections with those of other

countries, up to March 1, 1900. The physical features are lightly printed so as to give due prominence to the railway lines, which are very clearly indicated in colours. By the lettering and signs employed, the relative importance of towns, as regards population, is indicated. The map will doubtless prove useful to tourists and others visiting Italy.

Roma. **Instituto Cartografico Italiano.**

Carta Topografica della Provincia di Roma e Regioni Limitrofe, con Cartina Speciale del Colli Albani. Scale 1 : 250,000 or 3·9 stat. miles to an inch. Roma : Instituto Cartografico Italiano, 1900. *Price* 1.50 *lire.*

In addition to hill shading, elevations from sea-level to above 500 metres are shown on this map by four tints of colour. The altitudes of important peaks are also given in figures, but it is to be regretted that no attempt has been made to indicate the depths of the sea. The map is based on the recent government surveys.

Vienna. **Hartleben.**

Plan der Reichshaupt u. Residenzstadt Wien. Scale 1 : 20,000 or 0·3 stat mile to an inch. Mit Angabe der neuen Bezirkseintheilung und der früheren Gemeindegrenzen. Wien : A. Hartleben's Verlag. 1900. 8th edition. *Price* 2 *kronen.*

ASIA.

China. **Chevalier.**

Atlas du Haut Yang-Tse de I-Tchang Fou à P'ing-Chan Hien. Par le R. P. S. Chevalier, S.J. Observatoire de Zi-Ka-Wei, Shanghai.

With the publication of this, the second part of the 'Atlas du Haut Yang-tse,' Father Chevalier's large-scale chart of the river from I-chang Fu to Phing-Chan Hien is completed. The first part appeared some months ago, and gave, on thirty-eight sheets, the course of the river from I-chang Fu to Chung-King Fu; that now issued consists of twenty-nine sheets, including index and explanatory letterpress, and shows the river from just above Chung-King Fu to Phing-Chan Hien.

The basis of the survey is a series of latitudes and longitudes, astronomically determined, at fifty-one different places along the course of the river, a table of which is given, together with a statement of the methods employed. This should be specially useful to future travellers, as it will furnish them with fairly reliable fixed starting-points for their route surveys in the interior. Between these astronomically determined positions a compass-survey was carried out, every bend in the river being carefully observed, and the distances ascertained as nearly as possible by noting the time the junk took to pass from one place to another, making allowance for the speed of the current of the river. Soundings were taken continually, and these are recorded on the charts. As the whole of this section of the Yang-tse was passed over twice, opportunity was afforded for checking the survey, and altogether the work seems to have been carefully performed. A note is given explaining the system employed in the transliteration of names of places, which are also given in Chinese characters.

AFRICA.

Madagascar. **Locamus.**

Carte de Madagascar. Scale 1 : 500,000, or 7·8 stat. miles to an inch. Dressée par P. Locamus. Sheets: 2, Diego Suarez; 5, Maintirano. Paris: Maison Andriveau-Goujon.—H. Barrére.

All available information appears to have been utilized in the compilation of this map, which is now in course of publication, including the charts of the French Hydrographic Department, the geodetic work of the topographical service of the French army of occupation, the surveys of Pères Roblet and Colin, the route-surveys of explorers, and the documents published by the military administration under the authority of General Gallieni. The map is clearly drawn, and printed in four colours—sea, blue; hill-shading, brown; forests, green; and rivers, roads, and lettering, black. Altitudes, where they have been ascertained, are given in metres. When complete, the map will consist of twelve sheets, and its scale, 1 : 500,000, is sufficiently large to admit of considerable detail being shown.

Rhodesia. **Stanford.**

Map of Mashonaland, Matabeleland, etc. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. London : Stanford's Geographical Establishment, 1900. 2 sheets. Revised. *Price* 8*s.*

These two sheets form portion of Stanford's six-sheet map of Rhodesia, and embrace the region between the Zambezi and the Shire highlands on the north, the northern part of the Transvaal on the south, Portuguese East Africa on the east, and Bechuanaland on the west. The map contains a fair amount of detailed information, including

notes on the character of the country, navigability of rivers, etc., but no attempt has been made to show the relief, only the tops of isolated hills being indicated, and some heights given in figures. Boundaries are clearly shown, and railways have been brought up to date.

AMERICA.

New Brunswick. **Ganong.**

Map of Nictor Lake and Upper Nepisiguit River, New Brunswick. Compiled by W. F. Ganong, 1899. Reprinted from *Bulletin of the Natural History Society of New Brunswick*, No. xviii., 1899. *Presented by the Natural History Society of New Brunswick.*

AUSTRALIA.

New South Wales. **Department of Lands, Sydney.**

Map of New South Wales, including Lord Howe Island. Scale 1 : 506,880 or 8 stat. miles to an inch. Department of Lands, Sydney, N.S.W., 1898. 9 sheets. *Presented by the Department of Lands.*

This large nine-sheet map of New South Wales has been constructed at the Department of Lands, Sydney, under the direction of Mr. E. Twynam, Chief Surveyor, from the latest surveys and topographical information up to the date of its publication. It has been photolithographed from the original drawing, but it cannot be said that the method of reproduction has proved very satisfactory. Many of the names are so small that it is impossible to read them without a glass, and in places where they appear over hill-shading, which is itself very confused, they are almost illegible. However, as the map has evidently been compiled with care, and contains a great deal of information, it will be of service to all who are interested in the colony.

CHARTS.

United States Charts. **U.S. Hydrographic Office.**

Pilot Chart of the North Atlantic Ocean for April, 1900. U.S. Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Balearic Islands. **Sternberg.**

Seventy-seven Photographs of the Balearic Islands, by F. Sternberg, Esq. *Presented by F. Sternberg, Esq.*

This is an interesting set of "quarter-plate" photographs of the scenery and inhabitants of the Balearic islands. The following is a list of their titles :—

Majorca.—(1) General view of the city of Palma; (2) The cathedral, Palma; (3) Residence of the Captain-General, Palma; (4) British Vice-Consulate, Palma; (5) El Consulado, Palma; (6) La Lonja, Palma; (7) Interior of La Lonja, Palma; (8) El Ayuntamiento, Palma; (9) Cloister of San Francisco church, Palma; (10) Patio of the Casa Caleza, Palma; (11) Calle de la Almudaina, Palma; (12) A typical street, Palma; (13) Valdemosa; (14) Old woman at Valdemosa; (15) School children, Valdemosa; (16) Miramar; (17) Interior of museum, Miramar; (18) Old bedstead, museum, Miramar; (19) Hospederia, Miramar; (20) Monk, Miramar; (21) Majorcan conveyance; (22) Village of Deya and surrounding country; (23) Soller; (24) River and bridge, Soller; (25) Ayuntamiento, Soller; (26) Country and road near Soller; (27) Fornalutx; (28) Entrance to Fornalutx; (29, 30) Groups at Fornalutx; (31) Washerwomen, Soller; (32) Typical dress, Pollensa; (33) Roman bridge, Rollensa; (34) Curious-shaped fountain, Pollensa; (35) Calvario, Pollensa; (36) Majorcan windmill; (37) Old olive trees; (38) Majorcan peasant, with sheepskin covering.

Minorca.—(39) Entrance to harbour, Port Mahon; (40) Quay, Port Mahon; (41) Church, Port Mahon; (42) Market-place, Port Mahon; (43, 44) Streets showing windmills, Port Mahon; (45) Street fish-seller, Port Mahon; (46) Street, Port Mahon; (47) Group, Port Mahon; (48) Monument erected during governorship of Sir Richard Kane; (49) Megalithic stone; (50) Talayot; (51) View from top of Talayot; (52) Church built during French occupation; (53) View from top of church.

Ivica.—(54) Town of Ivica from opposite side of harbour; (55) Cathedral, Ivica; (56) Door of cathedral, Ivica; (57) A choice window, Ivica; (58) Town of Ivica, from near cathedral; (59) Town of Ivica and harbour from cathedral; (60) Principal entrance to old town, Ivica; (61) Main gate, Ivica; (62) Interior of Ayuntamiento, Ivica; (63) Archives of Ayuntamiento, Ivica; (64) Roman statue, Ivica; (65) Market-place, Ivica; (66) A potter, Ivica; (67) Water-cart, Ivica; (68) A typical street,

showing balconies; (69) Gate of a Feixa; (70) A milk-seller; (71) Water-wheel; (72) Countrywomen returning from market; (73) Charcoal-seller; (74) A fortified church; (75) Girl of Santa Eulalia in Sunday dress; (76) Men of Santa Eulalia in Sunday dress; (77) Countrywoman whitewashing house.

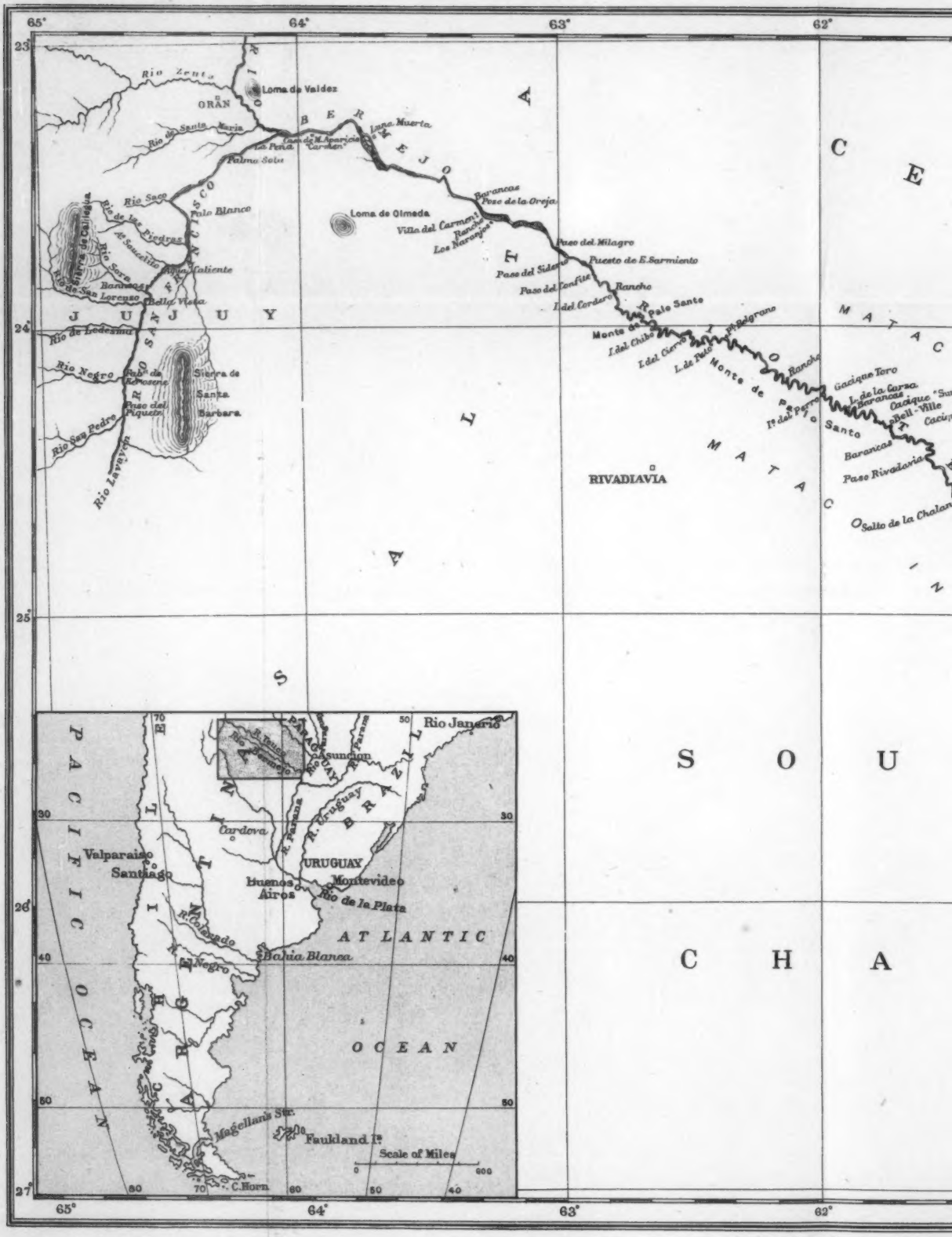
Shan States. **Carey.**

Ninety-nine Photographs taken by F. W. Carey, Esq., in the Shan States, on the borders of China and Burma, 1899. *Presented by F. W. Carey, Esq.*

The special interest attaching to these small photographs is that they were taken in a region of which comparatively little was known before Mr. Carey's visit; hence they form a very welcome addition to the Society's collection. The following list of titles will give an idea of the subjects represented:—

(1) Ta Ya-Ku on a market day; (2) Lo Hei girl in Ta Ya-Ku market; (3, 4) Kawa girls in Ta Ya-Ku market; (5) Temple at Meng Wang; (6) Akka men and women, Meng Wang; (7) Waiting for the ferry, Kiang Hung; (8) Ferry boat on the Mekong at Kiang Hung; (9) View of Cheng Wan plains, west of Szemao; (10) Temple at Lung Tang; (11) A native; (12) A Pai-I bridge; (13) Waterwheel used by the Shans for irrigating; (14) Yen luong, French post on the Red river above Hanoi; (15) Prai Hutt, French post on the Red river above Yenbay; (16) Red river rapid; (17) The Great Rapid, Red river, Lukay to Manhao; (18) Crossing the Great Rapid; (19) Group travelling up the Red river; (20) Outside the custom-house at Mengtoz; (21) View of the European houses at Mengtoz; (22) View outside Talang; (23) Suspension bridge over the Papien river; (24) Street, Pu Erh-Zu; (25) The Custom House, Szemao; (26) Group of Chinese and Custom's officials at the opening of the Szemao custom-house; (27) Interior of Confucian temple, Szemao; (28) Temple near Szemao; (29) Native houses near Szemao; (30) Ts'ai shen, the God of Riches and his attendants; (31) Kuei Hsing, the God of Literature; (32) A Szemao beggar; (33) The market, Szemao; (34) Tibetans in the market, Szemao; (35) Cotton porters outside the custom-house, Szemao; (36) A funeral procession, Szemao; (37) View from the city wall, Szemao, looking south; (38) Group taken at the opening of the British Consulate, Szemao; (39) Lieut. Gordon, of the West Yorkshire Regiment, hoisting the British flag for the first time at Szemao; (40) A deaf and dumb beggar boy; (41) East gate of Szemao; (42) Szemao from the west; (43) A blind beggar; (44) Cattle at rest; (45) Bull for sale; (46) The French consul in his official chair; (47) Village women of the Szemao plain; (48) Village girls of the Szemao plain; (49) Native of Szemao; (50) Hearse used in important funeral processions at Szemao; (51) Commencement of a big funeral procession at Szemao; (52) Han Pai-I women; (53) View of Szemao river; (54, 55) Lolos dancing; (56) Szemao stonemason's idea of a lion; (57) A god carried in procession; (58) Cars carried in procession; (59) Cars carried in procession, with little boys in fancy dress; (60) Mr. Carl, Commissioner of customs, leaving Szemao in his official chair; (61) A Mahe woman; (62) A Kato girl, and a villager; (63) Criminal's head suspended from tree; (64) Punishment of a horse thief; (65) Old lady beggar, Szemao; (66) Chinese temple near Szemao; (67) A Yao man; (68) Mahe women and girls of Szemao; (69) A procession at Szemao; (70) The Nam Ban river, near Pu Yuan; (71) A Chinese funeral, bourgeois' class, Szemao; (72) A group of Shans; (73) Yao women; (74) Akkas of Meng Wang, west of the Mekong; (75) Akka woman; (76) Kawa men in market at Menghin; (77) Kawa girls in market in Menghin; (78) Ferry across the Mekong at Hsin Tu Kou; (79) Pai Shans playing at the love game of throwing coloured balls; (80) Hua Yao Pai girls of Hsiao Meng Yang; (81) The Ta Tang or Great rapid, between Lukay and Manhao; (82) The east gate of Szemao; (83) Manhao; (84) Buddha in rocks at side of Red river; (85) A Shan temple at Chen Le po; (86) A Shan house; (87) Shan girl of Menglien; (88) Hsiang Tan Lolos of Iwu; (89) The Mekong at Hsin Tu Ku; (90) Hei Pai-I, or Black-skirted Shans; (91) Akkas of Chiu-fang, west of the Mekong; (92) Level-head Akka woman; (93, 94) Apparatus for hulling grain; (95) Pu Tu girls; (96) Woni woman and child; (97) The Tea Hills of Ibang, showing tea-trees; (98) Pu Yuan Pen Jen woman, and the ferry across the Nam Ban, near Pu Yuan; (99) No title.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.



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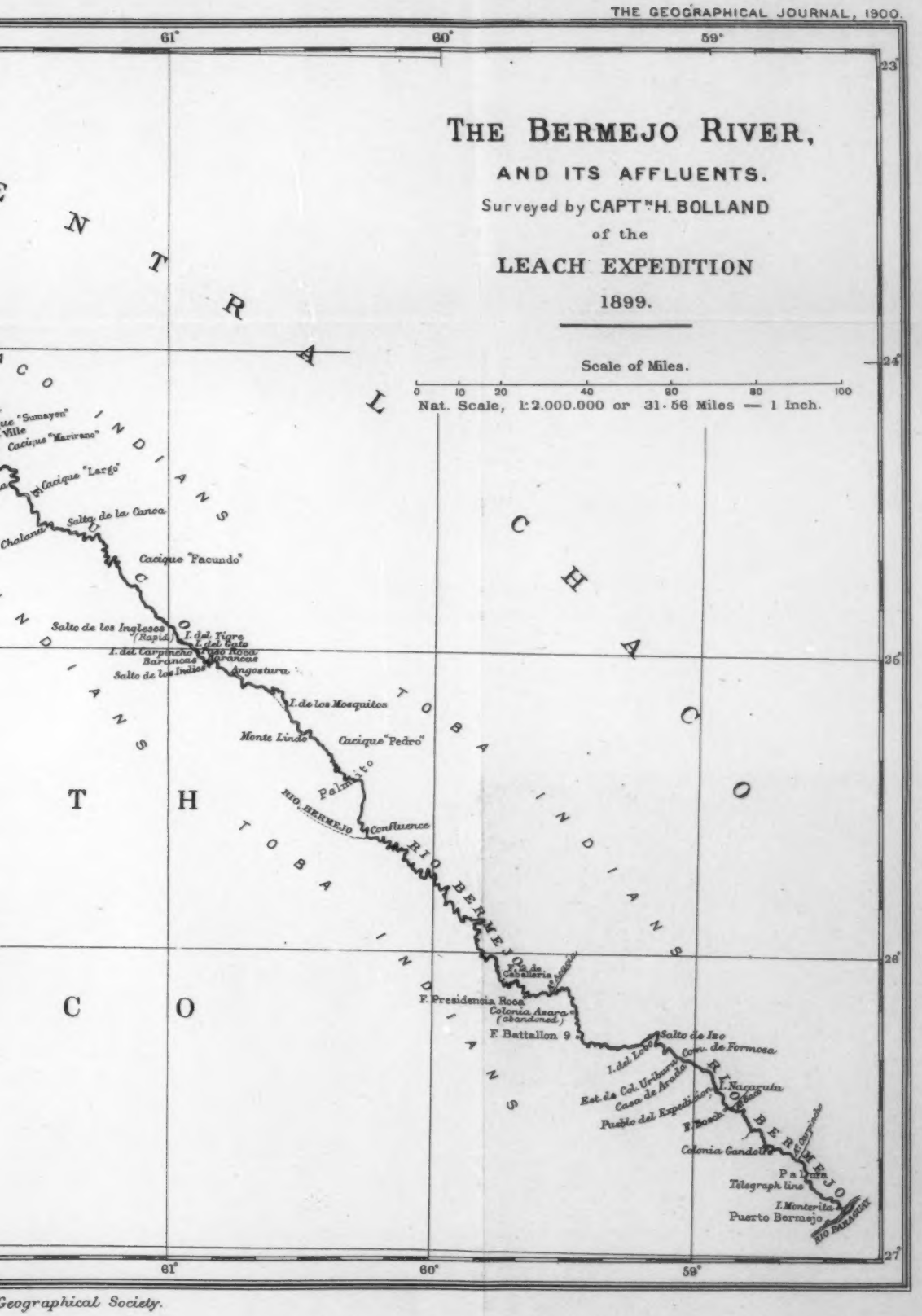

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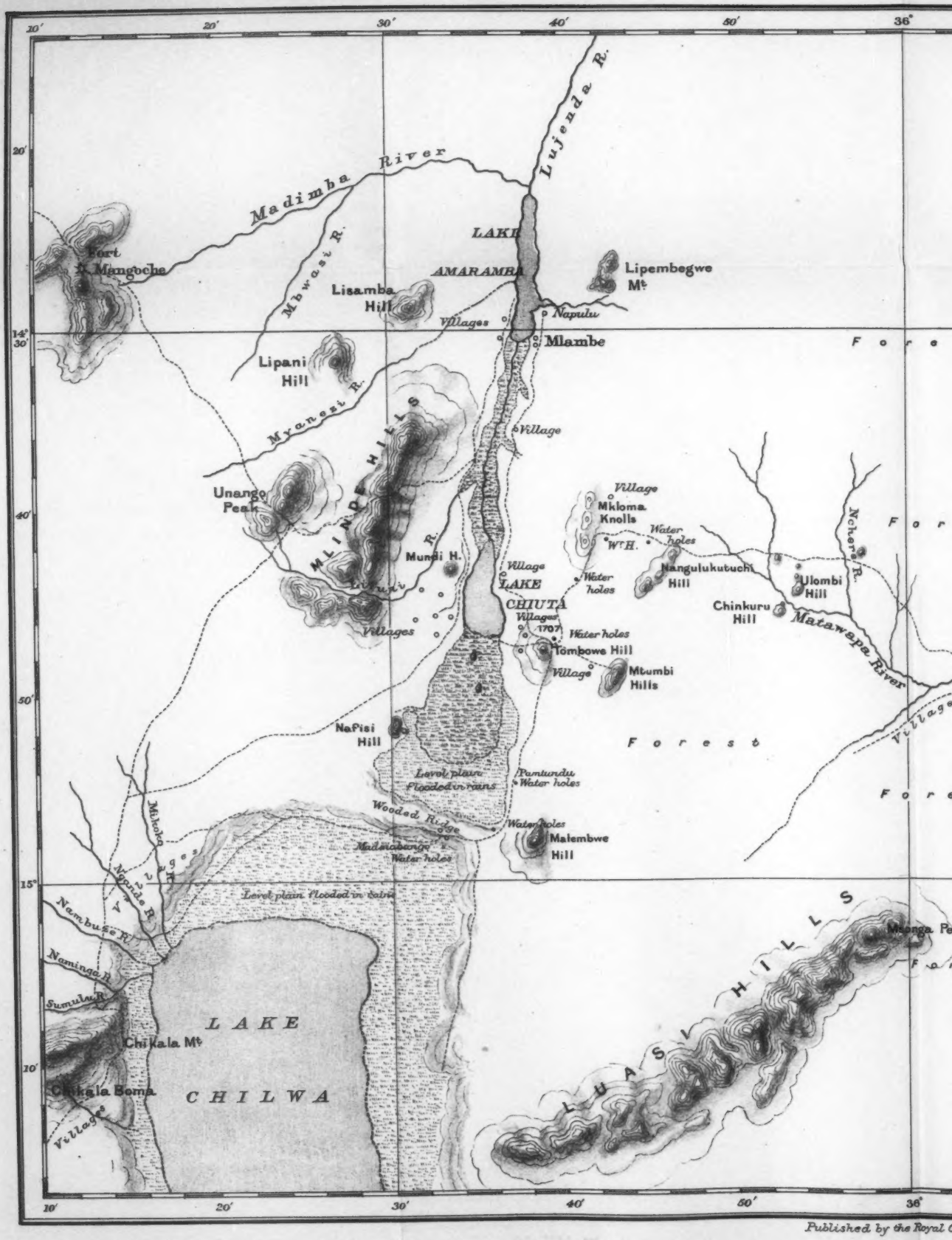

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THE COUNTRY BETWEEN
LAKE CHIUTA AND RIVER LULI
BRITISH CENTRAL AFRICA

from a survey by

CAPT. F. B. PEARCE.

Very high Mountains

Scale of Miles

0 5 10 20

Nat. scale 1:500,000 or 7·89 miles = 1 inch.

Heights in feet

Native paths .....

10′ 20′ 30′ 40′ 50′

14° 30′ 20′ 40′ 50′

Forest

Mtungwe Mt. 9000

Maripa Peak

RIVER MTAMKULU

River

Namwero Hills

Kwamba's 2142

1718

RIVER LULI

RIVER NALUME

1000 to 1200 ft.

ga. Peak

GERMAN EAST AFRICA

C. Delgado

R. Rovuma

R. Rovuma

R. Msalu

LAKE NYASA

Lujende

Luli

Livingstonia

R. Luli

CENTRAL AFRICA

MOZAMBIQUE

L. Chiuta

Zomba

Blantyre

Shire R.

R. Angoche

Zambesi R.

PORTUGUESE EAST AFRICA

MOZAMBIQUE CHANNEL

Quilimane

English Miles

0 50 100 200

15° 35° 10′

Royal Geographical Society.

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